

RE-EXAMINATION OF THE SPECIES OF PROTURA DESCRIBED  
BY H. WOMERSLEY

BY S. L. TUXEN, ZOOLOGICAL MUSEUM, COPENHAGEN, DENMARK

Fig. 1-98

Within the framework of my re-examination of the species of Protura described prior to 1945 (and a few others), I have long felt the need to examine the species described by H. Womersley. This author in 1924 first reported the finding of Protura in England with specimens then determined as the well known species *Acerentomon doderoi* Silv. Later (1927-28) he described this material as a new species (*A. bagnalli*), together with six other new species from the British Isles. Late in 1929 Womersley was appointed to the Australian Council for Scientific and Industrial Research to work in Western Australia on the Lucerne Flea and Red Earth Mite problem. On his way to Australia he spent some weeks in the Cape Town region of South Africa on this problem and there collected a species of Protura which he later described (1931). Since that time he has described eight species and one subspecies from Australia and two species from the United States of America.

Through the kindness of Mr. Womersley and the Board and Director of the South Australian Museum, Adelaide, I have been privileged to borrow the whole of his collection of Protura, now in the South Australian Museum. A few species not present in this collection have been most kindly lent to me by Dr. A. J. Hesse of the South African Museum, and Dr. Theresa Clay of the British Museum (Nat. Hist.), London. To all these scientists and institutions I extend my warmest thanks for their comprehending co-operation. The 18 species and one subspecies described by Womersley, including one species renamed by Bonet, are the following:

1. *Eosentomon westraliense* Wom. 1932.
2. *Eosentomon swani* Wom. 1932.
3. *Eosentomon millsii* Wom. 1938 from U.S.A.
4. *Eosentomon millsii* Wom. 1939 from Australia = *E. womersleyi* Bonet 1942.
5. *Eosentomon millsii* var. *australiana* Wom. 1939.

6. *Paraentomon clevedonense* Wom. 1927.
7. *Proturentomon iowaense* Wom. 1938.
8. *Acerentomon bagnalli* Wom. 1927.
9. *Acerentomon nemorale* Wom. 1927.
10. *Acerentomon oblongum* Wom. 1927.
11. *Acerentomon metarhinus* Wom. 1928.
12. *Acerentomon agrorum* Wom. 1928.
13. *Acerentomon pinus* Wom. 1928.
14. *Acerentulus capensis* Wom. 1931.
15. *Acerentulus westraliensis* Wom. 1932.
16. *Acerentulus australiensis* Wom. 1932.
17. *Acerentulus tillyardi* Wom. 1932.
18. *Acerentulus occidentalis* Wom. 1932.
19. *Acerentulus sexspinatus* Wom. 1936.

These species will be dealt with in the above order and in accordance with my earlier type of re-examination, *i.e.*, with special reference to the setae and sensillae on the foretarsus, the filamenta di sostegno and abdominal combs in the *Acerentomidae*, the female squama genitalis and the third tarsus in the *Eosentomidae*, as well as the chaetotaxy, although other characters will be considered where necessary. The numbering of the setae and sensillae follows my plan from earlier papers (Tuxen 1956-60, Bonet and Tuxen 1960). All figures are original.

Womersley marked several of his slides as "Type" but not, however, for all species and in several cases slides of the different stages of a species were also similarly marked.

I have, therefore, disregarded this as a regular designation of a holotype—in his papers no holotypes are designated—but have selected a lectotype for each species preferably from amongst the slides marked "Type". Only in cases where the description is based on a single individual has this been regarded as a holotype.

#### 1. *Eosentomon westraliense* Womersley

*Eosentomon westraliensis* Womersley 1932 p. 73, fig. 4-6, 17-18.

*Eosentomon westraliense* Womersley 1939 p. 287, fig. 79 F-I.

Fig. 1-9.

This is the first *Eosentomon* described by Womersley and the description was based on statements of length in  $\mu$  and on the chaetotaxy. In 1939 the description was repeated almost word for word, but the drawings were new. In his collection one slide of a male

from "King's Park, Perth, Western Australia, 21st April 1931" is marked as "Type". I take this as a lectotype. Two other slides are marked "Paratype". One of these, a larva 2 from "Crawley, W.A. 10th October, 1931, D. C. Swan" may be a paratype though it is not mentioned in the first description; the other one, however, a female from Glen Osmond, South Australia, 9th July 1933, cannot be a paratype, being found after the publication of the original description. I may, however, select it as a neo-allotype, because the shape of the female genitalia is so important for the understanding of the species of the genus *Eosentomon*.

The foretarsus, fig. 1-2, shows the following characteristics: t1 is slightly pointed, elongate oval, and set much nearer to a3 than to a3'. The distal part from t1 (termed d) is almost exactly equal to the proximal part from t1 (called p), so that d:p = 1.00<sup>(1)</sup>, a is very short, a' long and exceeding the tip of t1, d is longer than t2.

Especially remarkable is the position of c' quite near to b'1 and b'2; the tip of s is shortly club-shaped; the empodium is long in relation to the claw, ratio e:u (empodium to unguis) = 0.9; TR (ratio claw to tarsus) is stated by Womersley to be 6.0 but I am unable to make it more than 5.0.

The shape of the head is given in fig. 3 drawn from the neo-allotype. The pseudoculi are very large, 1:6 of the head length, but broader than shown in the figure, where they are seen in fore-shortened view. The mouth parts (fig. 4) are very much like those of *E. wheeleri* Silv. (Bonet and Tuxen 1960). The mandibles are striated in the outermost part, and their tips are not smoothly rounded but with three very small "teeth". There is a structure (hyp) which may be the hypopharynx seen by Prell in 1913, but not by me in *Accrentomon* (Tuxen 1959).

Tarsus III (fig. 5) with a very stout spine. The chaetotaxy (fig. 6-7) is as follows, the pleural setae being included in the number of tergal setae:

	I	II-III	IV-V	VI	VII	VIII	IX	X	XI	XII
t	$\frac{4}{8}$	$\frac{10}{14}$	$\frac{10}{16}$	$\frac{8^{(2)}}{16}$	$\frac{4^{(3)}}{16}$	$\frac{6}{7}$	8	8	8	$\frac{6 + 2^{(4)}}{3}$
s	$\frac{4}{4}$	$\frac{6}{4}$	$\frac{6}{10}$	$\frac{6}{10}$	$\frac{6}{10}$	7	4	4	8	$\frac{8^{(5)}}{4}$

(1) The importance of this ratio was stated by Bonet and Tuxen (1960 p. 27) for *E. wheeleri* Silv. Unfortunately by a slip the ratio was given as 8:7 = 1:15. It should read 7:8 = 0.88.

(2) "3" is missing; (3) "1-3" are missing; (4) very small, almost points; (5) 6 long and 2 small setae.

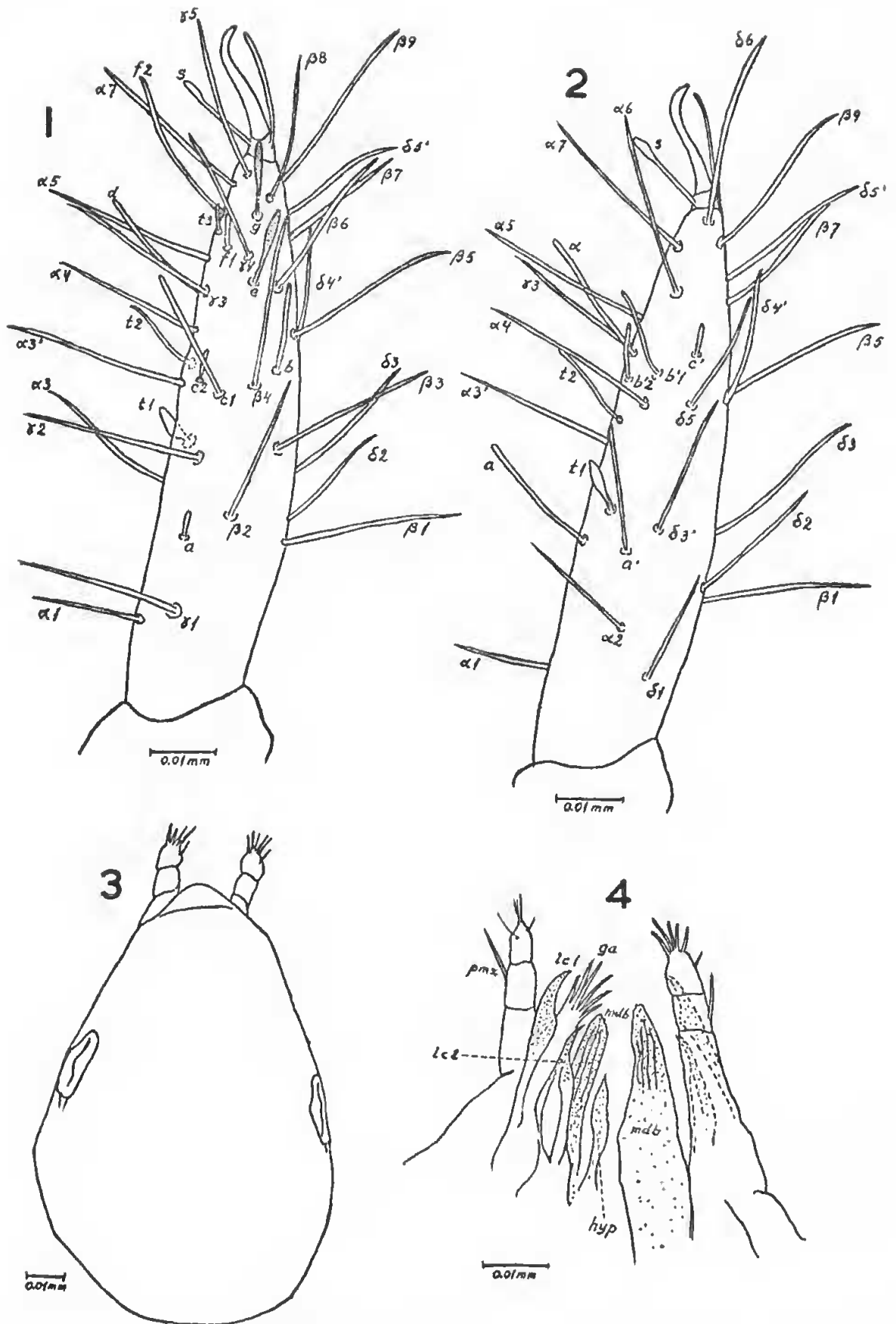


Fig. 1-4. *Eosentomon westraliense* Wom. 1, exterior side foretarsus of lectotype ♂; 2, interior side of same; 3, contour of head of neo-allotype ♀; 4, mouth-parts of lectotype ♂ — ga, galea; hyp, hypopharynx; lc 1 and 2, lacinia; mdb, mandible; pmx, maxillary palpus.

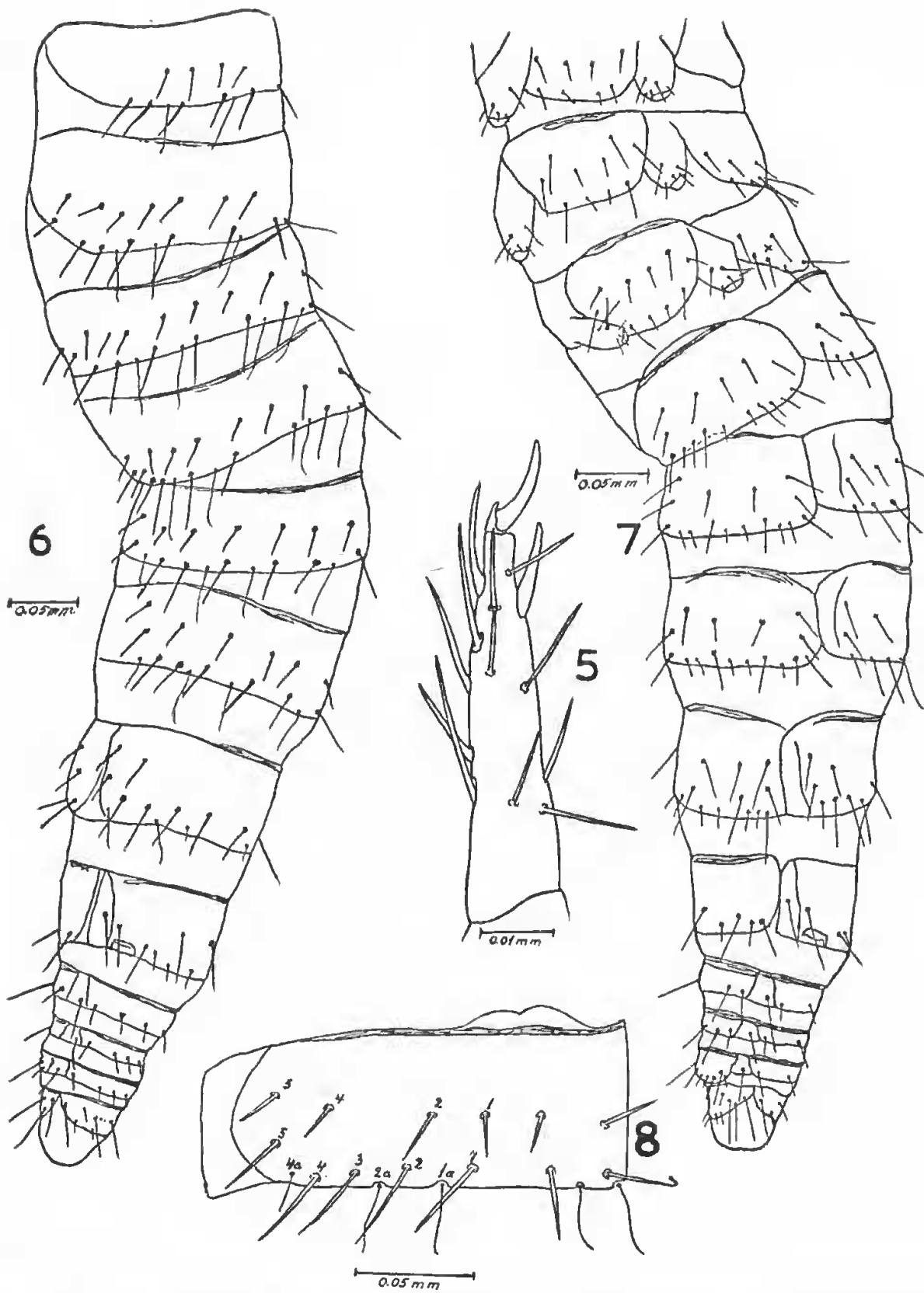


Fig. 5-8. *Eosentomon westraliense* Wom.; Lectotype ♂. 5, right tarsus III; 6, abdominal tergal chaetotaxy; 7, abdominal sternal chaetotaxy; 8, chaetotaxy of sixth abdominal tergum with numbering of setae.

The chaetotaxy does not entirely agree with the figures given by Womersley 1932 and 1939, which also do not agree. It is, however, identical in the type specimen (male) and the neo-allotype except for an individual variation in the former; the posterior row on tergite III shows 8 setae on the right side (shown in fig. 7 where the supernumary seta is marked "X"). Fig. 8 is part of the sixth tergite showing the length and enumeration of the setae; the thin accessory setae "1a" and "2a" are as long or longer than the principal ones on all tergites except "1a" on tergite VII.

The squama genitalis of the female neo-allotype is shown in fig. 9. The actual shape of the processus sternales (p.st.) is rather difficult to see and is different from that of all other species known to me.

*Lectotype*: a male from "King's Park, Perth, W.A., 21/4/31".

*Neo-allotype*: a female from "Glen Osmond, S.A., 9/7/33".

Both in the South Australian Museum collection.

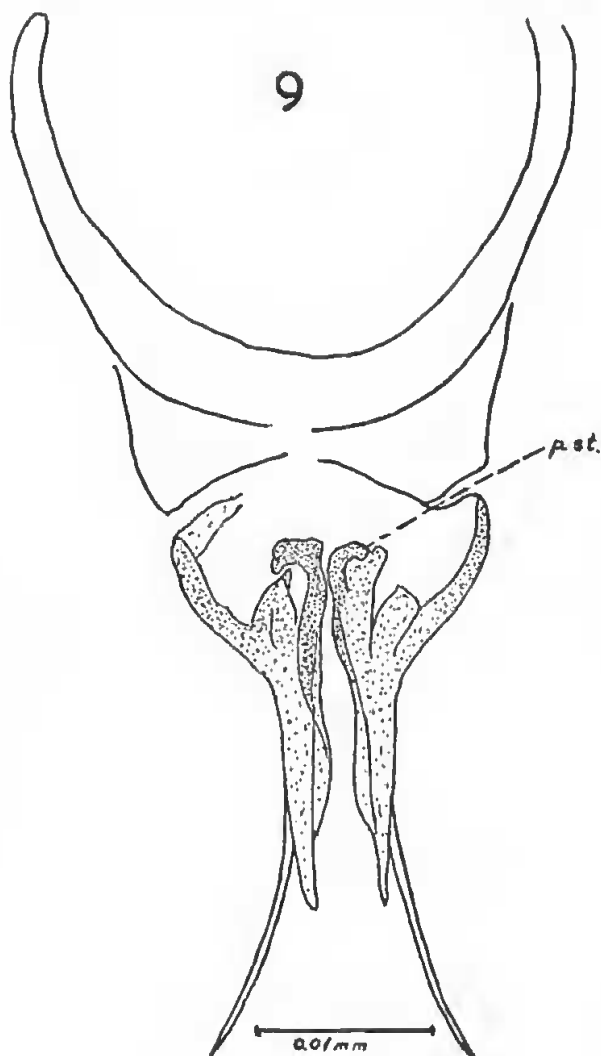


Fig. 9. *Eosentomon westraliense* Wom.; Neo-allotype ♀. Squama genitalis from dorsal side—p.st., processus sternales.

2. *Eosentomon swani* Womersley

*Eosentomon swani* Womersley 1932 p. 75, fig. 7-8, 19-20; 1939 p. 287, fig. 79 A-E.

## Fig. 10-16.

The description gave only the measurements in  $\mu$  of parts of the body and the statement "chaetotaxy as figured". In 1939 it is repeated almost word for word, but the figures of the chaetotaxy of t VII-IX differ slightly. In a key on p. 289 (1939), there is an important new statement "tarsus III without a strong subapical dorsal spine". This, however, is incorrect. In the collection are two slides both marked "Type"; one, a female, I take as a lectotype; other slides are marked as paratypes. The following new description is of the lectotype.

The foretarsus (fig. 10-11) is much broader in relation to length than in *westraliense*, or in fact in most *Eosentomon* species known to me; t1 is relatively large and placed on a level with  $\alpha 3$ ; thus being much nearer to the distal than to the proximal end of the tarsus, d:p = 1.36; t2 is short and slender, t3 relatively long, a is rather short, b thicker than the other sensillae, a' very long and reaching to the tip of t1. Very curious is the long and sinuate c', s is long with pointed club. TR = 4.5, e:n = 0.85.

The shape of the head is shown in fig. 12; the pseudoculi are rather small, about  $\frac{1}{11}$  of the head. The mouth parts are shown in fig. 13; the mandibles are striated as in *E. westraliense*, and also like *E. vermiforme* Ewing (see Bonet and Tuxen 1960 p. 273).

Tarsus III (fig. 14) has a very distinct subapical spine.

The chaetotaxy is as follows:

	I	II-III	IV-VI	VII	VIII	IX	X	XI	XII
t	$\frac{4}{8}$	$\frac{8^{(6)}}{16}$	$\frac{8^{(6)}}{16}$	$\frac{4^{(7)}}{16}$	$\frac{6}{9^{(8)}}$	8	8	8	$\frac{6+2^{(9)}}{3}$
s	$\frac{4}{4}$	$\frac{6}{4}$	$\frac{6}{10}$	$\frac{6}{10}$	$\frac{2}{7}$	4	4	8	$\frac{8}{4}$

The chaetotaxy of t VI is given in fig. 15; "1a" is abnormally missing on the left side.

The squama genitalis of the female (fig. 16) shows two distinct V-shaped proximal sclerites, probably the processus sternales, but appearing as if free of the distal sclerites of the acrogyne.

(6) "3" is missing in t II-IV, although found on the left side of t II; (7) "1", "3", and "5" are missing; (8) almost points; (9) a small seta quite near the glandular opening, absent in *westraliense*.

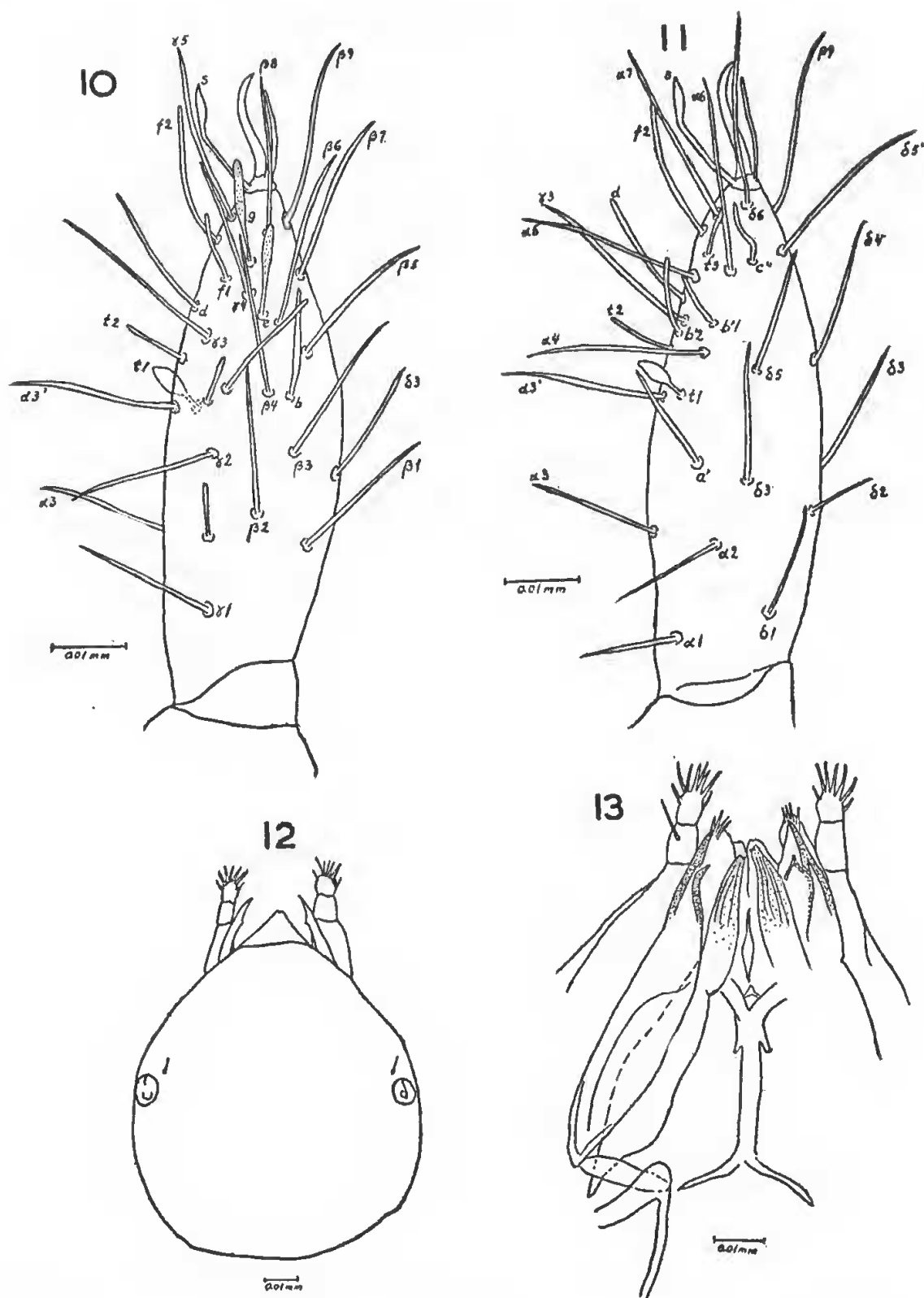


Fig. 10-13. *Eosentomon swani* Wom.; Lectotype ♀. 10, foretarsus, exterior side; 11, interior side of same; 12, contour of head; 13, mouth-parts, compare with fig. 4.



*Lectotype*: A female from "in moss, Crawley, Western Australia, 27/7/1931, D.C. Swan" in the South Australian Museum.

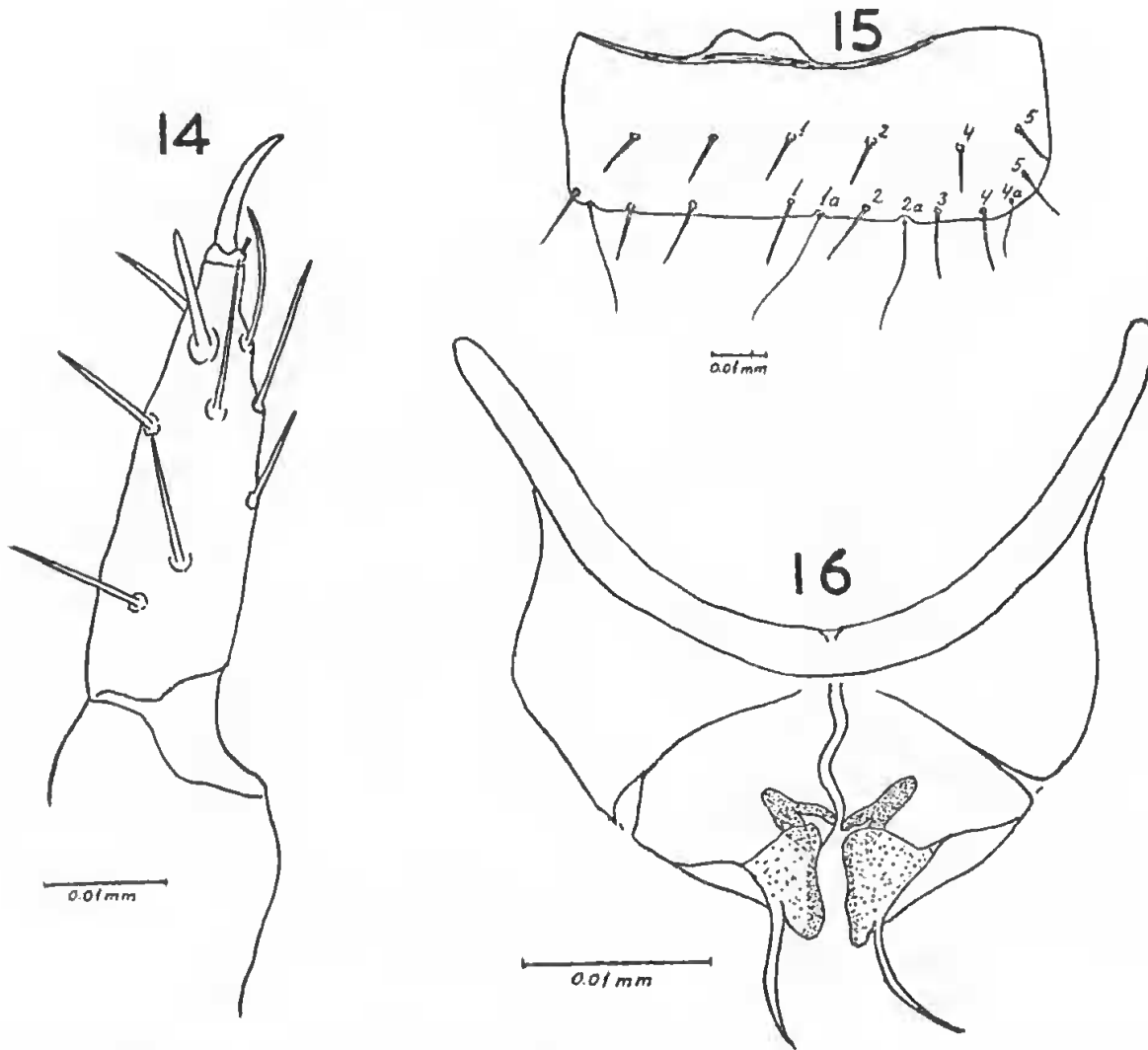


Fig. 14-16. *Eosentomon swani* Wom.; Lectotype ♀. 14, left tarsus III; 15, tergal chaetotaxy of sixth abdominal segment; 16, squama genitalis from ventral side.

### 3. *Eosentomon mills* Womersley

*Eosentomon mills* Womersley 1938 p. 221, pl. XII fig. D-G.

?*Eosentomon armatum*, Mills 1932 p. 130; nec *E. mills* Womersley 1939 (= *E. womersleyi* Bonet 1942), *vide* p. 16.

This species was described by Womersley in 1938 from specimens sent to him by Dr. Harlow B. Mills from Iowa, United States of America, and probably the same as Mills referred to in 1932 as *E. armatum* Stach. In 1940 Ewing, without giving any reason,

synonymised the species with *E. wheeleri* Silv. This synonymy has since proved to be correct. In 1939 Womersley recorded the species from Australia but Bonet in 1942 considered the Australian material as another species which he named *womersleyi* nom.nov. (see the following species).

In Womersley's collection are several slides of this species from the U.S.A.; one, a female without fore-legs, marked as the type; I have examined the characters of the fore and hind tarsi, the squama genitalis of the female and the chaetotaxy, and find complete agreement with *E. wheeleri* Silv. as redescribed by Bonet and Tuxen in 1960, and also in respect to the very long accessory setae in the posterior rows of the tergites. It is therefore unnecessary to give any figures. The synonymy given by Ewing, although he did not have an exact knowledge of *wheeleri* nor of the type material of *millsi*, is therefore justified.

*Lectotype*: A female from "Columbus Jnt., Iowa, U.S.A., 26/9/38" (probably an error for "1939 H. B. M(ills)") in the South Australian Museum.

#### 4. *Eosentomon womersleyi* Bonet

*Eosentomon millsi* Womersley 1939 p. 287, fig. 79 J-M; nec *E. millsi* Womersley 1938 p. 221.

*Eosentomon womersleyi* nom.nov. Bonet 1942 p. 16.

Fig. 17-23.

In his work on the Australian Apterygota 1939 Womersley recorded his *Eosentomon millsi* from Australia. He gave a description which is word for word identical with that of *millsi* 1938 except that a line (line 3, p. 289) had fallen out, the result being that the spine appears to be present on tarsus II. The figures, however, were new and different from those of 1938—it should be noted, however, that the figures of the chaetotaxy of *millsi* in 1938 were incorrect. From the difference in these figures Bonet concludes quite laconically: "pero basta comparar las respectivas figuras . . . para convencerse de que se trata de formas distintas"; he gives no further description but, without having seen the type, gives it the name *womersleyi* nom.nov.

As the figured chaetotaxy might have been wrong—as it is in both cases—the procedure of Bonet was rather audacious. Unfortunately only one specimen of *millsi* from Australia is present in Womersley's

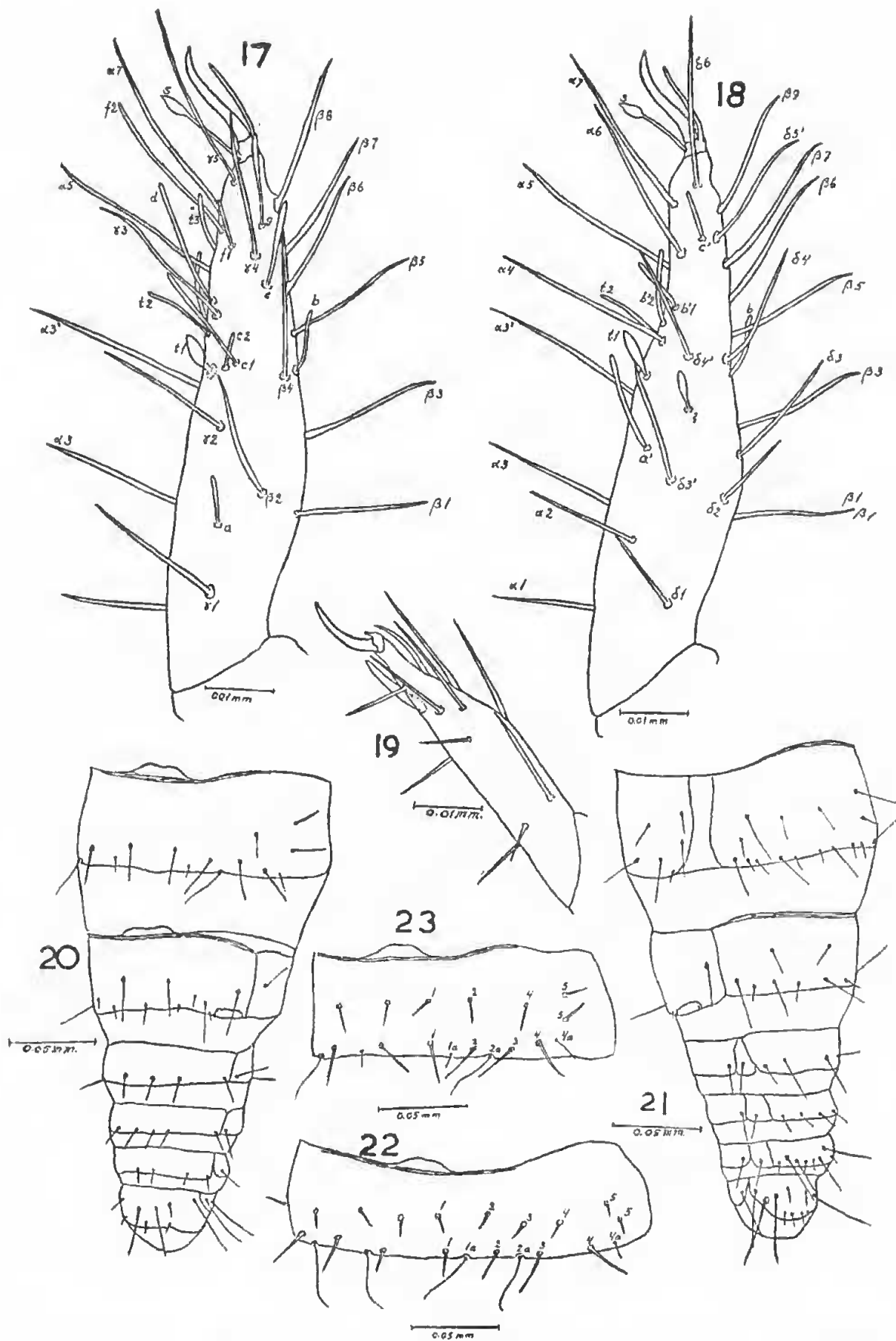


Fig. 17-23. *Eosentomon womersleyi* Bonet; Holotype ♂. 17, foretarsus, exterior side; 18, interior side of same; 19, left tarsus III; 20, tergal chaetotaxy of abdominal segments VII-XII; 21, sternal chaetotaxy of same; 22, tergal chaetotaxy of second segment with numbering of setae; 23, same of sixth abdominal segment.

collection and Womersley himself has added to the label "*womersleyi* Bonet 1942 nec *millsi* Wom. 1938" and the word "Type". This slide may be taken as the holotype. The specimen is a male and is described as follows, though of course without reference to the female genitalia.

The foretarsus (fig. 17-18) is first and foremost characterised by a redoubling of t1 on the interior surface, a feature not seen by me in any other *Eosentomon*. This occurs on both legs but may, of course, be an individual character. The sensillae and setae are mostly as generally found, a seems rather shortly club-shaped but the club is seen fore-shortened in the figure; t1 is placed far advanced, even distal to *a3'* and on a level with sensillae c1 and c2, d:p therefore = 0.65, even shorter than in *wheeleri*. TR = 5.3, e:u = 1.3,  $\delta 5$  is missing. Tarsus III (fig. 19) with a distinct spine.

The shape of the head cannot be given as it is broken. The mouth-parts are as in *westraliense* and *swani*, the mandibles with striae.

The chaetotaxy (fig. 20-21) also shows several characteristics and schematically is as follows:

	I	II	III	IV	V-VI	VII	VIII	IX	X	XI	XII
t	$\frac{4}{8}$	$\frac{10}{16}$	$\frac{8^{(10)}}{16}$	$\frac{8^{(10)}}{16}$	$\frac{8^{(10)}}{16^{(u)}}$	$\frac{4^{(12)}}{16^{(11)}}$	$\frac{6}{9}$	8	8	8	9
u	$\frac{4}{4}$	$\frac{6}{4}$	$\frac{6}{4}$	$\frac{6}{10}$	$\frac{6}{10}$	$\frac{6}{10}$	$\frac{2}{7}$	4	4	8	12

There are many curious features in this chaetotaxy; "3" is missing in the anterior row of t III-VI (in t VII "1" and "2" are also missing), thus abdomen II and III are different.

The accessory setae "1a" are longer than the principal ones on abd. II-IV, as are "2a" on all segments, but they are shorter on abd. V-VII; in all other species of *Eosentomon* known to me this only holds good for abd. VII. It is worthy of notice that the accessory setae "1a" are placed inside the border of the sclerite when they are short, but immediately outside when they are long (see fig. 22-23). This occurs in all species of *Eosentomon* known to me.

The two lateral setae on sternite IX are short and the two median long; on sternite X, however, all four are short.

The chaetotaxy and the foretarsus appear to me therefore to justify the regarding of this specimen as a separate species.

*Holotype*: A male from "Brown Hill Creek, Adelaide, S.A., 5th June 1932 D. C. Swan" in the South Australian Museum.

(10) "3" missing; (11) "1a" is very short; (12) "1-3" are missing.

### 5. *Eosentomon womersleyi* Bonet var. *australiana* Womersley

*Eosentomon millsii* var. *australiana* Womersley 1939 p. 289, fig. 79 N-Q.

In 1939 Womersley further described a variety of his *E. millsii*. Although from the description there should be several slides from various parts of South Australia, no slide with this name is present in the collection. In the text Womersley gives the following differences from the typical form: sternite VIII with no anterior row of setae, and on sternite IX (sic. "tergite" in error) the lateral setae are much smaller than the median. His fig. 79 Q also shows this, but as stated above, his figure of the typical form is wrong in respect to sternite IX, the difference in size of the lateral and median setae being present also in this form. In the key on p. 289 he further says that the accessory seta "2a" in the posterior row of tergite VII in var. *australiana* is absent; this is very improbable.

There remains, therefore, only one character separating the two forms, viz., the absence of the anterior row of setae on sternite VIII. If then, a form of *E. womersleyi* Bonet with  $s\ VIII = \frac{9}{7}$  be found and proved not to be an individual variation, then the var. *australiana* Wom. is a reality; till then we cannot say more of its existence. No holotype or lectotype.

### 6. *Paraentomon clevedonense* Womersley

*Paraentomon clevedonense* Womersley 1927a p. 145, fig. 4-7.

*Proturentomon minimum* Bagnall 1936 p. 212; Tuxen 1956a p. 241, fig. XIII-XV.

Fig. 24-27.

Of this British species which was described from three specimens "taken with others under deeply-embedded stones above Norton Wood, Clevedon, Som., 21.IX.1926. Found also in a similar habitat on Backwell Hills, Som., 16.X.1926", I have had two "type slides" before me, one from the South Australian Museum marked "Co-type, Clevedon, Oct. 1926, H. Womersley" and the other from the British Museum (Nat. Hist.) coll. Bagnall, marked "Paratype, West Town, Som., 10/10/26 H. Womersley" (both are determined as *Paraentomon clevedoniensis*, with the female adjectival ending). Neither of these belong to the series from Norton Wood, Somerset, England; but as both belong to the type material, I select the South Australian Museum specimen as the lectotype, because although smashed, it shows the characters, including the mouth-parts, very well.

Already in his description 1927 Womersley had stressed the resemblance to *Acerentulus minimus* Berlese, but Berlese had not observed that the second abdominal leg resembled the first but not the third and consequently Womersley had to replace his species in a new genus and even a new subfamily. Later Bagnall (1936) for quite theoretical reasons synonymised the two species, to which Womersley himself agreed in 1938, and which I myself in 1956 confirmed after having seen the type of *A. minimus* Berl.

In 1956 I gave a detailed description of the species, based on specimens from Rothamsted, England and sent to me by Dr. F. Raw under the name of *Proturentomon minimum* Berl. The type of Berlese's species was not fit for description although suitable for the checking of important characters. I have now checked the above type specimens of *clevelandense* (one on each slide) with my 1956 description and with the specimens from Rothamsted and find the closest resemblance so that it is unnecessary to draw or describe the lectotype of *P. clevelandense*, only some corrections and additions to my description of 1956 need be given.

The mouthparts (fig. 24) are very clear on the lectotype owing to its smashed state, wherefore I have thought fit to figure them. The shape of the mandible is important, shorter and stouter than in *Acerentulus* and with a long and distinct slit; in the maxillae the galea could not be seen. The pseudoculus is very peculiar, the "lever" being long triangular and nearly as broad as the "lid".

The last abdominal segments (fig. 25) show rows of very small teeth on the hind border of the ninth, tenth and eleventh tergite, and a small "lunula" of teeth on the middle of tergite XII.

The chaetotaxy. In 1956 (p. 244) I gave t VIII  $\frac{8}{13}$  and s X 2. Both these statements were due to having chosen an aberrant specimen for drawing. In this specimen (fig. XV 1) there were 7 setae in the anterior row on t VIII, but an examination of all the Rothamsted specimens as well as the present lectotype shows that there was a seta too many in the figured specimen and not one too few. The ventral view (fig. XV 2) was drawn from another aberrant specimen with only 2 setae on s X and 8 on s XII; the correct numbers are four and six. The examination of the present lectotype has further shown that my stating  $\frac{1}{4}$  for s I, which was given with a question mark, is correct.

In an examination of the 19 adult specimens of this species I have found two specimens with only two setae on s XI. This is a feature of the matus junior of *Acerentulus* (at least *danicus* Condé); only

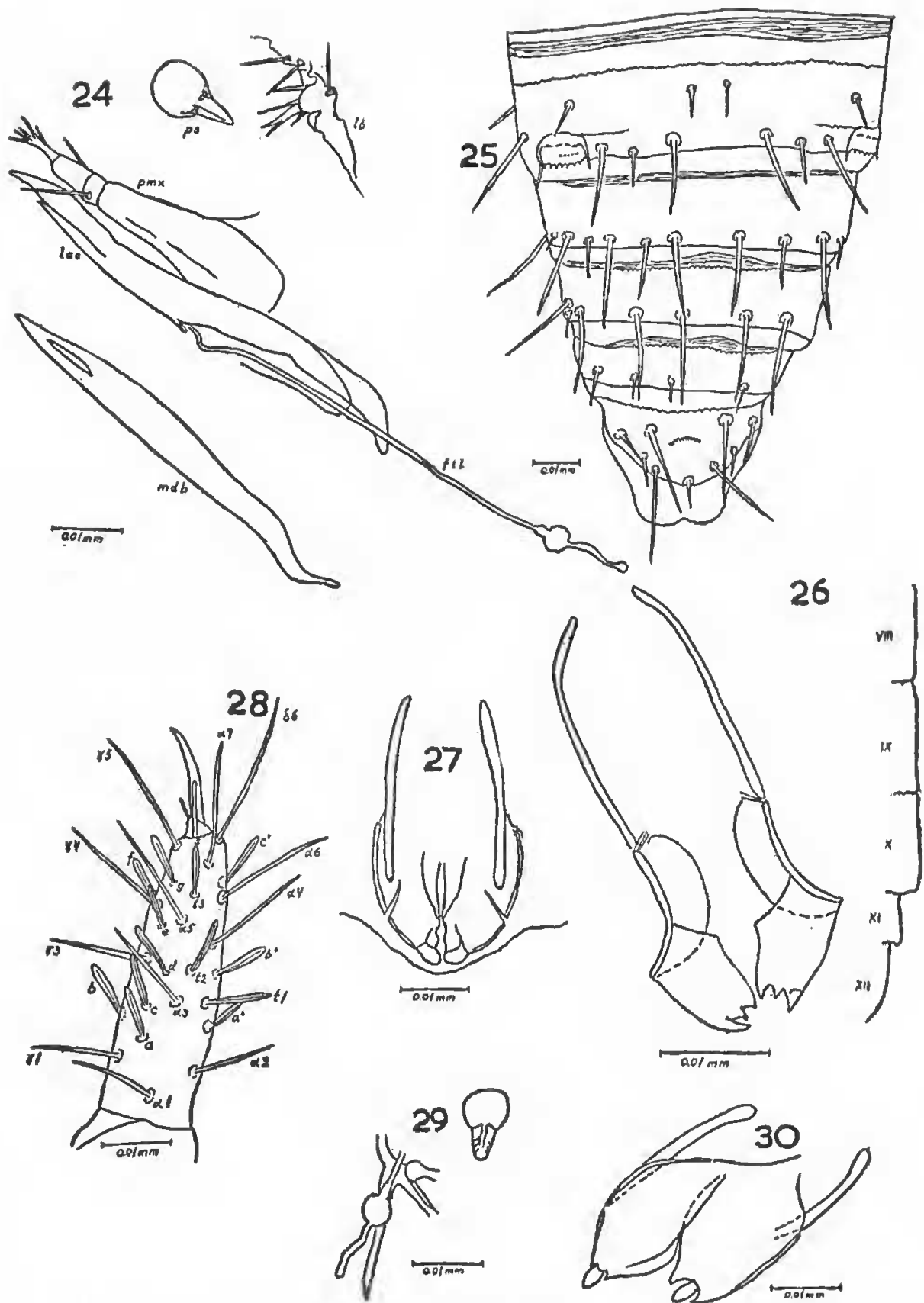


Fig. 24, 25 and 27. *Paraentomon elevodonense* Wom.; Lectotype ♀. 24, mouth-parts—fl, filamento di sostegno; lac, laciniae; lb, labium; mdb, mandible; pmx, maxillary palpus; ps, pseudoculus; 25, chaetotaxy of tergites VIII-XII; 27, squama genitalis.

Fig. 26. *Proturentomon minimum* Berl. ex Rothamsted, leg. Raw. genital squama of male†

Fig. 28-30. *Proturentomon iowaense* Wom.; Lectotype ♀. 28, left foretarsus from above; 29, filamento di sostegno and pseudoculus; 30, squama genitalis.

in one of these specimens, however, I could see the genitalia, and these seemed to differ from those of all other specimens (fig. 26). In fig. 27, I have drawn the genitalia of the lectotype of *clevedonense* which on comparison with Berlese's figure (Tav. IX, fig. 105) I would assume to be a female squama. All the specimens except the abovementioned have this squama and I have not seen one which I could, without doubt, consider a male. Whether the above specimens with s XI 2 are males or immature specimens, I do not venture to decide.

*Lectotype*: female from "Clevedon, Oct. 1926, H. Womersley", in the South Australian Museum, Adelaide.

From the above the long supposed synonymy of *Paraentomon clevedonense* Wom. with *Proturentomon minimum* Berl. and *Paraentomon* Wom. with *Proturentomon* Silv. will be evident. (The *Paraentomon* species of Ionescu belong to another genus, *Ionescuellum* Tuxen 1960.)

#### 7. *Proturentomon iowaense* Womersley

*Proturentomon iowaense* Womersley 1938 p. 221, pl. XII, fig. a-c.

Fig. 28-30.

This species was described without the designation of a holotype, or a statement of the number of specimens available. The description was reprinted by Ewing 1940 (p. 531) but nothing new was added. It was said to differ from *P. clevedonense* only in the absence of the two small anterior setae on tergites V and VI, and in the length ( $585\mu$  as against  $900\mu$ ). This latter, however, is incorrect, the length being about  $800\mu$ .

I have before me four slides of one specimen each; one marked "Type", the others "Paratype". I have selected that marked "Type" as a lectotype because it is best preserved. The species is extremely like the preceding.

The foretarsus (fig. 28) is shown as seen from above (both tarsi). The many sensillae, all equally long and stout, can be seen and may be counted together with the setae as I did for *P. minimum* Berl. in 1956, *i.e.*, in accordance with the numbering of the sensillae and setae in *Acerentulus-Acerentomon*. In this species all the sensillae could be identified with the sole exception of t1; in the present species also t1 is found and this gives a clear difference between the two species, but also more distinctly shows a near relationship to the *Acerentominae*. Womersley described these sensillae in *clevedonense*



as having a single median rib, which is clearly seen in the present species but probably is nothing more than an optical phenomenon. The ratio TR is given by Womersley (1938) as a difference between the two species, 3.2 in *iowaense* and 3.0 in *clevedonense*; but in 1927 he gave 2.8 for *clevedonense* and I would measure 2.9 in this species and 3.1 in *iowaense*; these differences, however, are too small and inexact to warrant species differentiation. The pseudoculus and filamento di sostegno (fig. 29) are as in *minimum* Berl. The comb of abd. VIII with many small teeth.

The squama genitalis of female (fig. 30) is difficult to see and understand clearly. I have drawn it as it appears to me in the lectotype; perhaps the differences from fig. 27 are of a specific nature.

The chaetotaxy is in all respects like that in the preceding species except that on tergites V-VI the two small anterior setae are missing as pointed out by Womersley (yet they are on t V in the lectotype). Also the small teeth on the hind margin of t IX-XI and on the surface of t XIII are clearly seen. One of the specimens is a matus junior without genitalia and with only two setae on s XI.

*Lectotype*: A female from the United States of America, "Columbus Jnt. Iowa, 26/9/32, H. B. Mills," in the South Australian Museum, Adelaide.

The species is very close to *P. minimum* Berl. differing only in the presence of t1, perhaps the shape of the filamento and squama genitalis, and the absence of the two small anterior setae not only on tergite VII but also on t VI and often on t V.

### 8. *Acerentomon bagnalli* Womersley

*Acerentomon bagnalli* Womersley 1927a p. 141 fig. 1.

Fig. 31-37.

This British species was described by Womersley "from a male specimen, one of many taken under old bark . . . Blaise Castle Woods, Bristol, Glos. 27.XII.1926". He mentioned that it is the species he recorded in 1924 as *doderoi* Silv. but does not indicate how it differs from this species. He introduces here two characters not previously used in Proturan taxonomy, viz., the relation between the lengths of the claw and tarsus of the foretarsus (TR) and the relation of the length of the labrum to that of the head (LR). Both characters have since been abundantly used. He also gives points to the chaetotaxy,

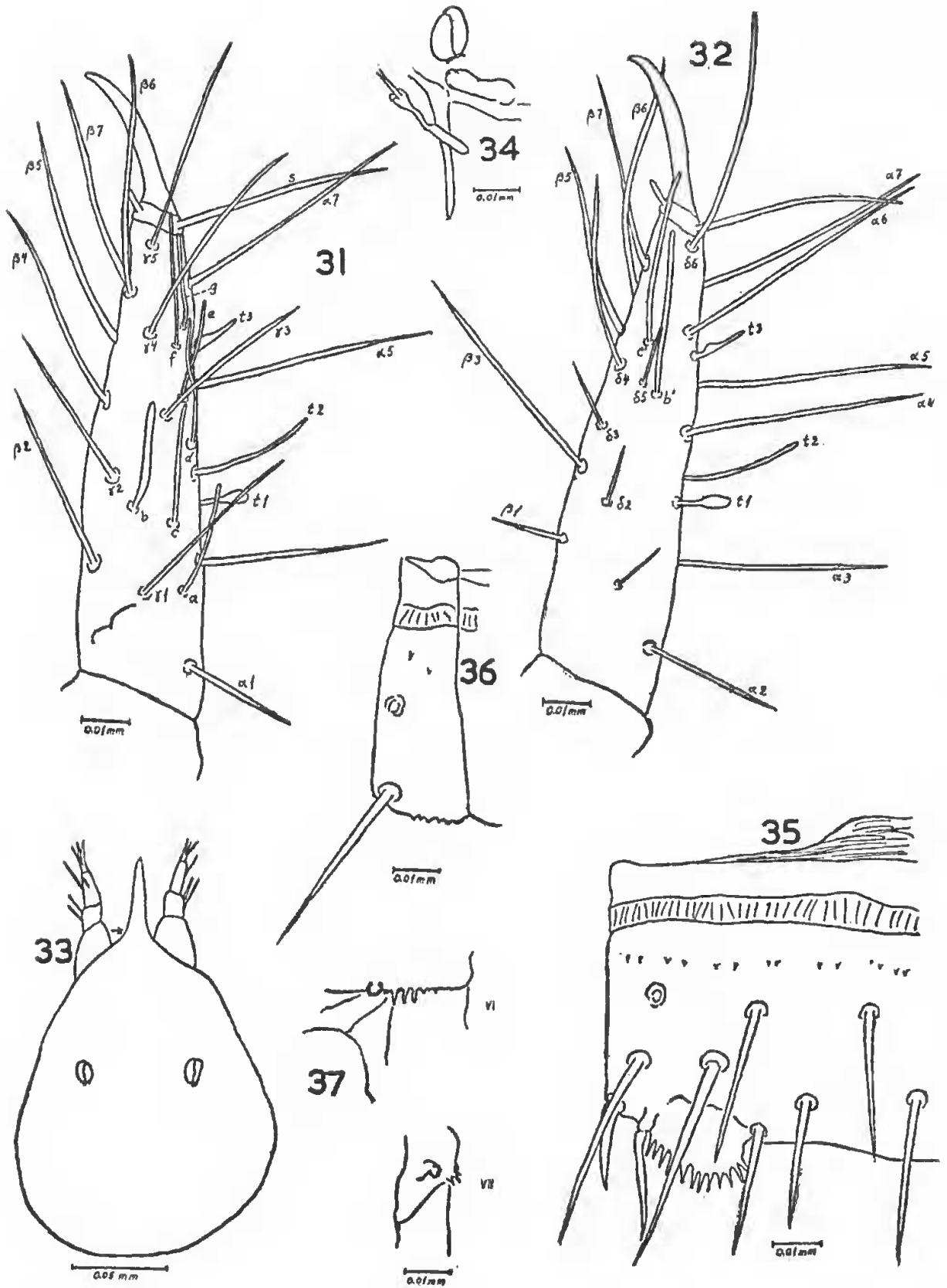


Fig. 31-37. *Acerentomon bagnalli* Wom.; Lectotype ♀. 31, foretarsus exterior side; 32, interior side of same; 33, contour of head, arrow points to base of labrum; 34, filamentum di sostegno and pseudoculus; 35, comb of abd. segment VIII; 36, pectine of pleurite VIII; 37, pectines of pleurites VI and VII, sternum to right.

a characteristic the significance of which was later elaborated by Ionescu.

In Womersley's collection twelve slides of this species are present, most of them containing young stages (as to the supposed stage with eleven abdominal segments in this species see my drawings in an earlier paper (Tuxen 1949 p. 47, fig. 72-75)), only two with adult specimens: "Mature female, type" and "submature male, cotype". All slides are from the locality and date mentioned in the description.

There seems every reason therefore, to believe that "male" in the description is a printer's error for "female", the more so as the "submature male cotype" is not a good specimen from which to describe the species. I have thus selected the female as a lectotype and marked it accordingly. It will be described as follows:

The foretarsus (fig. 31-32) with the setae and sensillae arranged as commonly found in *Acerentomon*, t1 is claviform, t2 long and slender, t3 long lancet-like, b much thicker than the other sensillae, e situated about in the middle between d and f, f longer than g. Seta s is very long and straight. On the inner side b' and c' are very long with the small  $\delta$  5 between them, a' is missing,  $\beta$  1 is short,  $\delta$  4 very long; TR = 3.0 (Womersley gives 3.4 through a printer's error as his measurements (35 $\mu$  to 105 $\mu$ ) show; e:u (empodium : unguis) = 1:7.

The head (fig. 33) with LR = 4.3; somewhat flattened in the slide. The filamento di sostegno (fig. 34) with short proximal part and heart-shaped dilation. The shape of the pseudoculus may be seen in the same figure.

The comb on the eighth abdominal tergite (fig. 35) does not reach as far backwards as in *doderoi* and has shorter and fewer (12) teeth; on tergite, pleurite and sternite are found rows of short spines, fewer and much shorter than in *doderoi*. The hind border of the pleurite carries 5 short teeth (fig. 36). In all the above characters the species is clearly distinguished from *doderoi* Silv. (see Tuxen 1960a).

Womersley (*loc. cit.*) mentioned a pectine on the eighth pleurite and fifth tergite. The first one must be a row of teeth on the hind border of pl. VIII mentioned above, the second must refer to a comb found on the anterior part of the sixth pleurite. In my paper on the Protura of Ionescu (1961) I have described these pleural "combs" in the genus *Acerentomon* as specified in the species *Ac. quercinum* Ion. In the present species the pectine on abd. VI carries some three long teeth and a small number of smaller teeth, that on pleurite VII carries two strong and two slender teeth (fig. 37). In this character also this species differs from *doderoi* Silv.

The chaetotaxy is as follows (the pleural setae are included in the tergal count):

	I	II	III	IV-VI	VII	VIII	IX	X	XI	XII
t	$\frac{6}{14}$	$\frac{10}{16}$	$\frac{10}{16}$	$\frac{10}{16}$	$\frac{10}{16}$	$\frac{8}{13}$	14	10	4	9
s	$\frac{3}{4}$	$\frac{5}{5}$	$\frac{7}{5}$	$\frac{7}{8}$	$\frac{5}{8}$	$\frac{4}{2}$	4	4	6	6

The "co-type male" has s VII =  $\frac{6}{6}$ . The hind border of s XII is very faintly serrate.

In many characters this species resembles *A. doderoi* Silv. but distinct differences are to be found in the characters of the abdominal pectines as well as in the chaetotaxy, t VII having  $\frac{13}{13}$  in *doderoi*, an extra seta being found between seta "4" in the anterior and posterior rows (and one more, "3a" in the posterior row), t XI has only four setae, the median pair being missing.

*Lectotype*: "Mature female under rotten bark, Blaise Castle, Bristol, 27/12/26, H. Womersley" in the collection of the South Australian Museum, Adelaide.

### 9. *Acerentomon nemorale* Womersley

*Acerentomon nemorale* Womersley 1927a p. 142, fig. 2.

Fig. 38-44.

This species, which with its 2 mm. length is among the largest Proturans known, was described from "one of two specimens taken in the rotten sapwood of an old stump in Brockley Combe, Somerset, 17.IV.1926". There is only one slide present in the collection, most probably a female though some impurities prevent a clear decision, with the date and locality as in the description. It is marked "Type" and may be regarded as the holotype, though Womersley expressly states, "genital organs well developed".

The foretarsus (fig. 38-39) of which only one leg is present has been examined and drawn from both the exterior and interior sides. Unfortunately some of the setae have been more or less broken off, a transverse line in the drawings indicates where they are broken; t1 is only represented by the socket so that it cannot be stated whether it is claviform, although it is most probably so, t2 is slender and curved and t3 is long lancet-like. The most characteristic feature is the short and slender sensilla b, shorter and not broader than c. The other

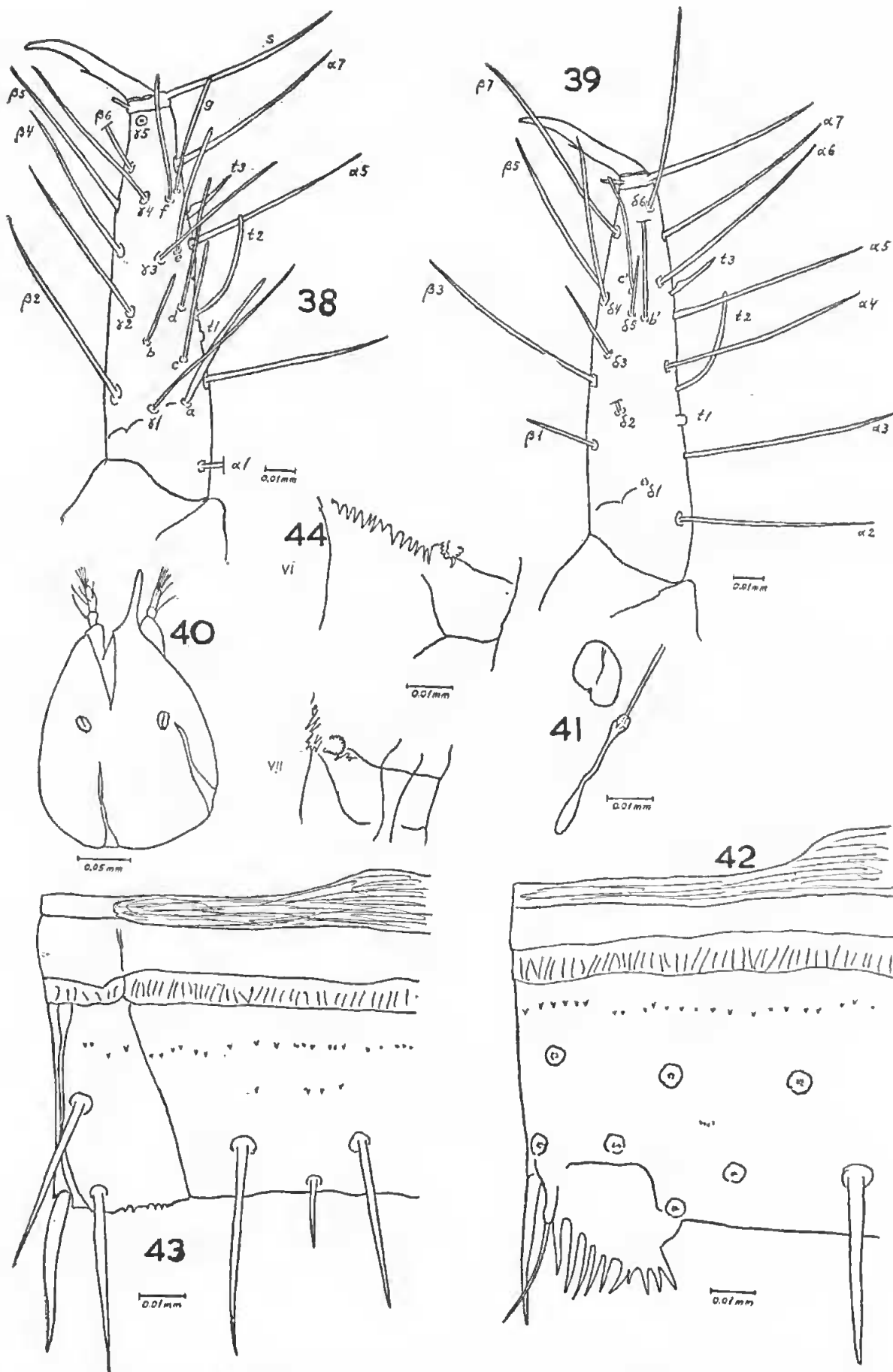


Fig. 38-44. *Acerentomon nemorale* Wom.; Holotype ♀. 38, foretarsus, exterior side; 39, interior side of same; 40, contour of head; 41, pseudoculus and filamento di sostegno; 42, comb of abd. VIII; 43, pleurite VIII and part of sternite; 44, pleural pectines on abd. VI and VII, sternum to left.

sensillae are long, a stouter than the others, e in the middle between d and f; a' is missing, b' near to c' with  $\delta$  5 between them, s long and straight. TR = 3.0, e:u = 7:45.

The head as shown in fig. 40, a little crushed. LR = 4.2 (Womersley has 2.8). The filamento di sostegno (fig. 41) with longer proximal part than in *bagnalli*. The comb on abd. VIII (fig. 42) is very characteristic with 9-10 strong and long teeth set apart, the most lateral one recurved against the others, the next two the longest, and numbers 6 and 8-10 equally long but diverging from the small number 7. A row of small blunt teeth is found near the striated line on the anterior part of the segment, and also ventrally. The eighth pleurite has 6-7 small blunt teeth along the hind margin (fig. 43).

The pectine on pleurite VI with about 15 long teeth and one or two more near the "rotary-wheel". Pleurite VII with a few sharp and slender teeth lateral to this wheel and two groups of stouter ones on the median side (fig. 44).

The chaetotaxy is as follows:

	I	II-III	IV	V-VI	VII	VIII	IX	X	XI	XII
t	$\frac{6}{14}$	$\frac{10}{16}$	$\frac{10}{16}$	$\frac{10}{16}$	$\frac{10}{16}$	$\frac{8}{13}$	14	10	6	9
s	$\frac{3}{4}$	$\frac{5}{5}$	$\frac{6}{8}$	$\frac{7}{8}$	$\frac{5}{9}$	$\frac{4}{2}$	4	4	6	6

The number of 6 setae in the anterior row of s IV is certainly an abnormality, although they are arranged symmetrically.

In t VII seta "1" is missing in the anterior row but a seta is present between number "4" in the anterior and posterior rows; in both characters it is distinguishable from the preceding segments.

The short and slender sensilla b of the foretarsus and the shape of the abdominal combs make this species clearly distinguishable. Unfortunately fig. 2 of Womersley is not correct in details of the pectines. The species has since been recorded by Condé (1944 p. 44) from France, and by Nosek (1957) and Paelt (1958) from Czechoslovakia. The last two authors, however, do not agree as to which species should be called *nemorale*; some specimens lent to me by Dr. J. Nosek, Bratislava, show that at least his species is another species which he is going to describe. Condé has seen that Womersley's pectine on abd. V in fact belongs to abd. VI and he also notes that the chaetotaxy of sternites II-IV "sont sujets à variations".

*Holotype*: Female(?) "under bark, Brockley Combe, Som. 17/4/26, H. Womersley" in the collection of the South Australian Museum, Adelaide.

#### 10. *Acerentomon oblongum* Womersley

*Acerentomon oblongum* Womersley 1927a p. 143, fig. 3.

Fig. 45-52.

Womersley described this species from two specimens "received from Mr. Bagnall, labelled Sta. Banks, Whitby, and Fencehouses". This species is not present in Womersley's collection in Adelaide, but a slide containing a specimen determined as this species and marked "Type" has recently come to the British Museum (Nat. Hist.), London, with the collection of R. S. Bagnall. It is furthermore labelled "Whitby, Sta. Bks" and must therefore be one of the two specimens mentioned by Womersley; I therefore select it as a lectotype and describe it as follows:

The foretarsus (fig. 45-46) is characterised by a long and extremely slender claw. Unfortunately many of the setae are broken, and in the figures, where it is not possible to complete from the other foretarsus this is indicated by a transverse line. Sensilla b is a little broader than the others which are all rather long and almost equally so, e is situated much nearer to d than to f, t1 is rather long and claviform, t3 lancet-like and not extremely long. The interior side is characterised by an extremely long  $\delta$  4. TR = 2.5 (Womersley gives 1.6, but his figures "front tarsus 101 $\mu$ , claw 45 $\mu$ " give 2.2), e:u = 10:67.

The head (fig. 47), upon which the specific name is based is of quite different shape to that of other species of *Acerentomon*. It is broken in the mid-line as shown in the figure, but its long and narrow shape is obvious. The rostrum is long, exceeding the maxillary palpi, but LR amounts to only 4.7. The shape of the pseudoculus is shown more enlarged; it shows a small but distinct sort of "handle" or "lever". The filamenta di sostegno could not be seen.

The comb of abd. VIII (fig. 48) consists of 14 teeth, the four median ones being shorter and more dispersed than the laterals. The anterior part of this segment carries only a few very small dispersed teeth. The pleurite has 4-5 small blunt teeth on the hind border (fig. 49). Pleurite VII with two stout and two fine teeth, pl. VI with a row of about 7 rather long and acute teeth (fig. 50).

The chaetotaxy is not easy to follow, as the anterior part of the body is twisted and the four posterior segments so much withdrawn

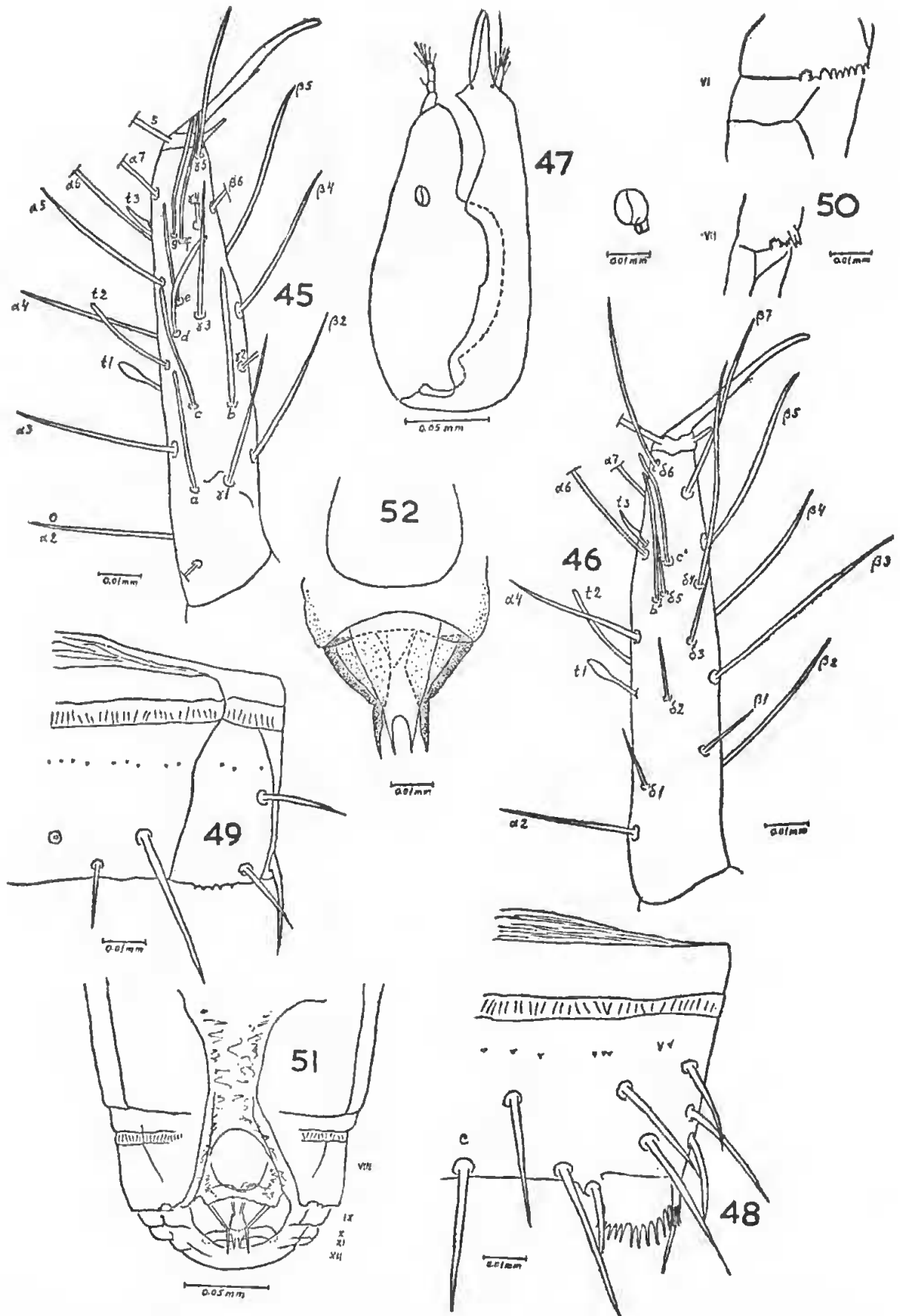


Fig. 45-52. *Acerentomon oblongum* Wom.; Lectotype ♀. 45, foretarsus exterior side; 46, interior side of same; 47, contour of head, to the side a pseudoculus; 48, comb of abd. VIII; 49, pleurite and half of sternite of abd. VIII; 50, pectines of pleurites of abd. VI and VII, sternum to right; 51, genital squama from venter and in situ; 52, same, more enlarged.



into abd. VIII that their setae are hardly distinguishable. It may be given as follows:

	I	II	III	IV-VI	VII	VIII	IX	X	XI	XII
t	†	†	$\frac{10?}{16}$	$\frac{10}{16}$	$\frac{10}{16}$	$\frac{8}{13}$	14	12?	†	9
a	†	†	$\frac{7}{5}$	$\frac{7}{8}$	$\frac{5}{9}$	$\frac{4}{2}$	4	4	†	6

The most curious feature of the whole animal, however, is the genital squama, if I identify it correctly. The specimen unfortunately is not cleared as much as could be wished, and the characters of the last segments are obscured by their contraction. Fig. 51 gives a sketch of the genital squama *in situ*, and fig. 52 of the squama itself more magnified. It looks as if two sclerotised rods connect the basis of tergite VII with the pectinal parts of tergite VIII but proximally these rods seem to be fused in the middle, and the whole structure may also be interpreted as an "endosternum", a view which seems to be supported by its finer structure. Distally a structure of loose contour appears to connect the "rods" and from this extends what I presume to be the real squama genitalis, corresponding to the distal part of the common squama. It consists of an aerogynium(?) and two acrostyli, ending in a seta or cannula. Between these acrostyli two more styli are found, but their connections to the other parts I am unable to follow, nor can I see the true opening of the vagina—if it is at all a female squama. The acrostyli are covered dorsally by two weakly chitinised "wings" and the whole squama is situated in a "cave" opening in the usual way. I have only seen the type specimen and as the species has not been recorded since the original description I am unable to investigate it further. I hope, however, that the species may be rediscovered, and that then, some one from the above indications, may get enough material to solve the problem.

*Lectotype*: Female(?) marked "Whitby Sta. Bks., R. S. Bagnall" in the British Museum (Nat. Hist.), London.

### 11. *Acerentomon metarhinus* Womersley

*Acerentomon metarhinus* Womersley 1928a p. 113.

Fig. 53-57.

This species was described from a single specimen "from amongst tangled bracken roots under a stone in Cranham Woods, Glos., 13/9/26". Womersley reported the specimen to be of the eleven-segmented instar: in earlier papers (1949, 1956a) I have shown that

the instar does not exist, and the specimen in question rightly appeared to be a *maturus junior* (see fig. 57). Because of this the chaetotaxy is not to be relied upon; on the other hand Womersley is right in stating that the characters LR and TR are constant throughout the larval life, and this holds good also for the further characters of the foretarsus (see Tuxen 1949 where it is also shown that all these characters are different in the prelarva, not known to Womersley). I give a description of the characters seen on the specimen, which unfortunately is crushed and difficult to examine.

The foretarsus (fig. 53-54) (only the left one is present) is rather short and broad. It is characterised by sensilla b being slender, and e placed much nearer to d than to f, t1 is slenderly claviform, t3 short but slender.  $TR = 2.7$  (Womersley gives 3.0),  $e:u = 6:52$ .

The head is very squashed; fig. 55 gives its rough outline but the hind border is difficult to ascertain. LR is given as 6.4, to me it seems more like 6.0. The pseudoculi are as figured, the filamento di sostegno could not be seen.

The comb on abd. VIII (fig. 56) carries about 14 slender but rather short teeth of which the middle ones are the longest, decreasing slowly in length to both sides. The hind border of the pleurite carries four very short and fine teeth, but there are only a few short and dispersed teeth on the anterior part of the segment. The pectines on pleurites VI and VII, if any, could not be seen.

The chaetotaxy (fig. 56) could not be seen on the first four abdominal segments; on abd. V-XII it is as follows:

	V-VII	VIII	IX	X	XI	XII
†	$\frac{10}{16}$	$\frac{8}{13}$	12	8	4	9
•	$\frac{5}{8}$	4	4	4	2	6

but it must be remembered that the specimen is a *maturus junior*, which is further shown by the presence of only two setae on the sternum XI (see Tuxen 1949 p. 28).

It will be seen that there are only very few really characteristic features present, among them being the slender sensilla b, and the position of e on the foretarsus, and especially the shape of the comb on VIII. Nevertheless both Ionescu (1932) and Condé (1944) mention this species from Roumania and France, respectively. I do not know

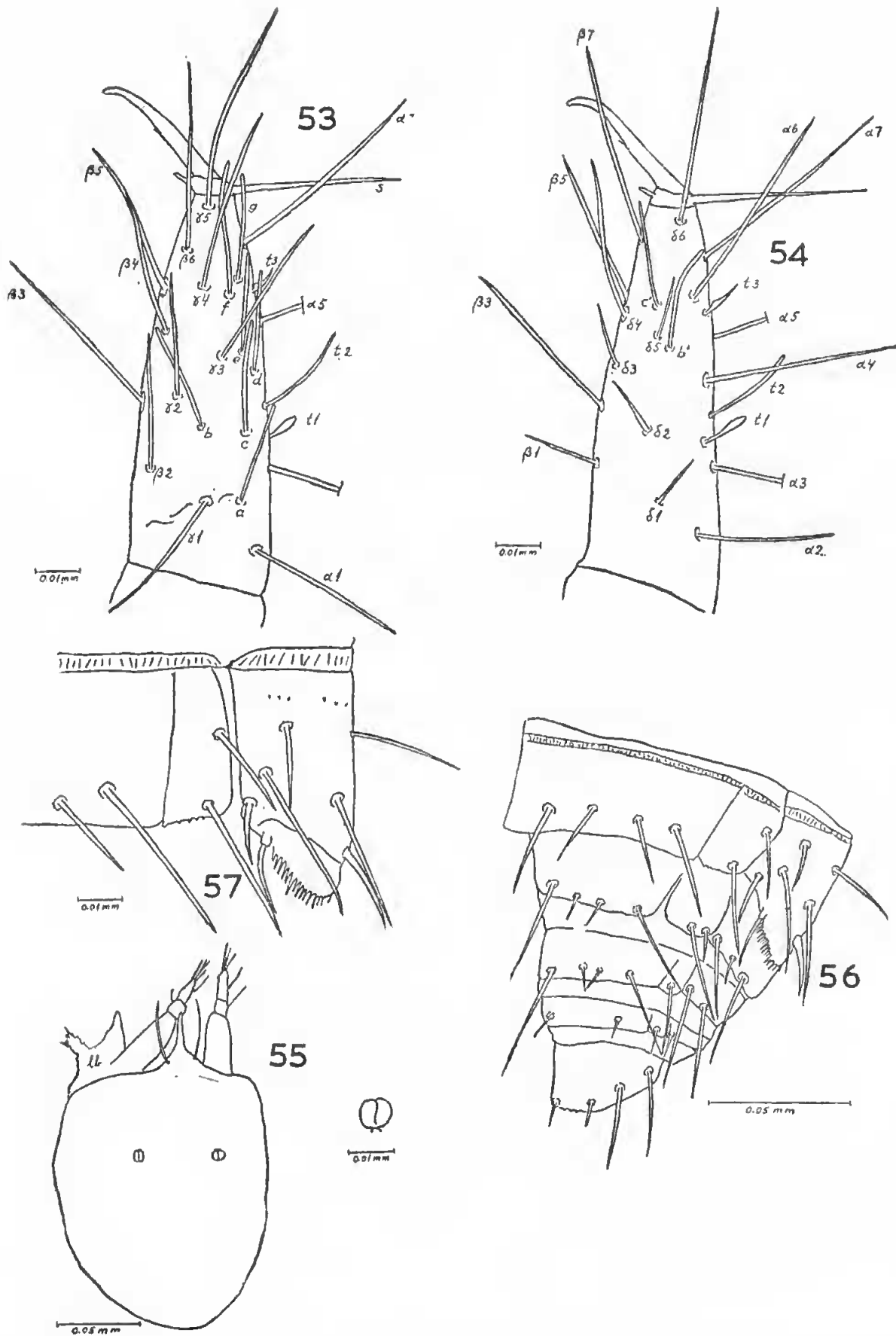


Fig. 53-57. *Acerentomon metarhinus* Wom.; Holotype, a maturus junior. 53, foretarsus exterior side; 54, interior side of same tarsus; 55, contour of head and right pseudo-culus; 56, chaetotaxy of abd. VIII-XII; 57, comb of abd. VIII.

on what characters these determinations are founded; both authors only give the length in  $\mu$  of some parts of the body, appendages or setae, but these measurements are often not the same as given by Womersley and even not the same between the two authors. For instance: TR = 2.6 (Condé), 2.75 and 2.55 (Ionesen), 3.0 (Womersley)—and 2.7 for my measurement of the holotype; or length of rostrum  $25\mu$  (Condé, Ionesen, in adult individuals),  $27\mu$  (Womersley in the matusus junior). It is therefore, not quite certain that the reports of this species from France and Roumania are correct; the species was not present in that portion of Ionesen's collection which I have had before me (Tuxen 1961). Condé mentions a line of teeth on both tergite V and VI, but I have not been able to see these pectines on the holotype; maybe they are not present in the matusus junior.

*Holotype*: A matusus junior from "Cranham, Glos., 13/9/26, H. Womersley" in the collection of the South Australian Museum, Adelaide.

## 12. *Acerentomon agrorum* Womersley

*Acerentomon agrorum* Womersley 1928a p. 114.

This species was described from a "single specimen from under stone along with *Acerentulus confinis* Berlese, Brockley Combe, Somerset, October, 1926". In Womersley's collection, specimens of *A. confinis* from the above locality are present, but on none of the slides could any *Acerentomon* be found and no slide of *agrorum* is present; nor in the collection of Bagnall is there any specimen bearing the name *A. agrorum*. It must, therefore, be concluded that the single specimen, the holotype, has been lost.

From the description alone, the species cannot be identified. Apart from some measurements only three characters are given by Womersley: LR = 4.1, TR = 2... (but his figures give 2.5), and spines on the eighth tergal pectine of equal length. These characters, however, are too insignificant to make a characterisation of the species possible, and nobody has found specimens since then; and furthermore the description was made on an immature specimen (called the eleven-segmented instar, which means matusus junior). It seems therefore advisable to abandon this species altogether from future catalogues.

13. *Acerentomon pinus* Womersley

*Acerentomon pinus* Womersley 1928a p. 114.

Fig. 58-62.

This species too, was described from a matusus junior (Womersley says a specimen of the "eleven segmented instar" but the limit between the eleventh segment and the end segment is very distinct) "under bark of an old pine stump, Brockenhurst, New Forest, 24/5/26"; and only this specimen is so far known. It is not very well mounted, not all the characters being distinguishable. It will be described as follows:

The foretarsus (fig. 58-59) is characterised by a very long sensilla a which is somewhat thicker than the other sensillae, b is relatively short and slender, e long and placed nearer to d than to f, t1 is relatively long with a slender club, t3 short but slender. All the setae are very long, especially conspicuous being the  $\gamma$  setae. TR = 2.7 (Womersley gives 2.6), e:u = 6:53.

The shape of the head is shown in fig. 60, LR = 3.3. The filamento di sostegno cannot be seen.

The comb on abd. VIII (fig. 61) has 12 relatively short but slender teeth. A row of very dispersed and very small teeth on the anterior part of the segment. The hind border of pleurite VIII (fig. 62) with three short teeth. Pectines on pleurite VI and VII not visible, either missing or too hyaline to be seen.

The chaetotaxy on the first three abdominal segments cannot be seen as the specimen is coiled in the slide. For the rest it is as follows:

	IV-VI	VII	VIII	IX	X	XI	XII
t	$\frac{10}{16}$	$\frac{10}{17}$	$\frac{8}{13}$	12	8	6	9
s	$\frac{5}{8}$	$\frac{4^{(13)}}{8}$	4	4	4	2	6

The number of 2 setae on s XI shows the specimen to be a matusus junior (see above).

*Holotype*: A matusus junior from "Brockenhurst, 24/5/26. H. Womersley" in the collection of the South Australian Museum, Adelaide.

(13) Abnormal, one of the setae being placed in the middle line.

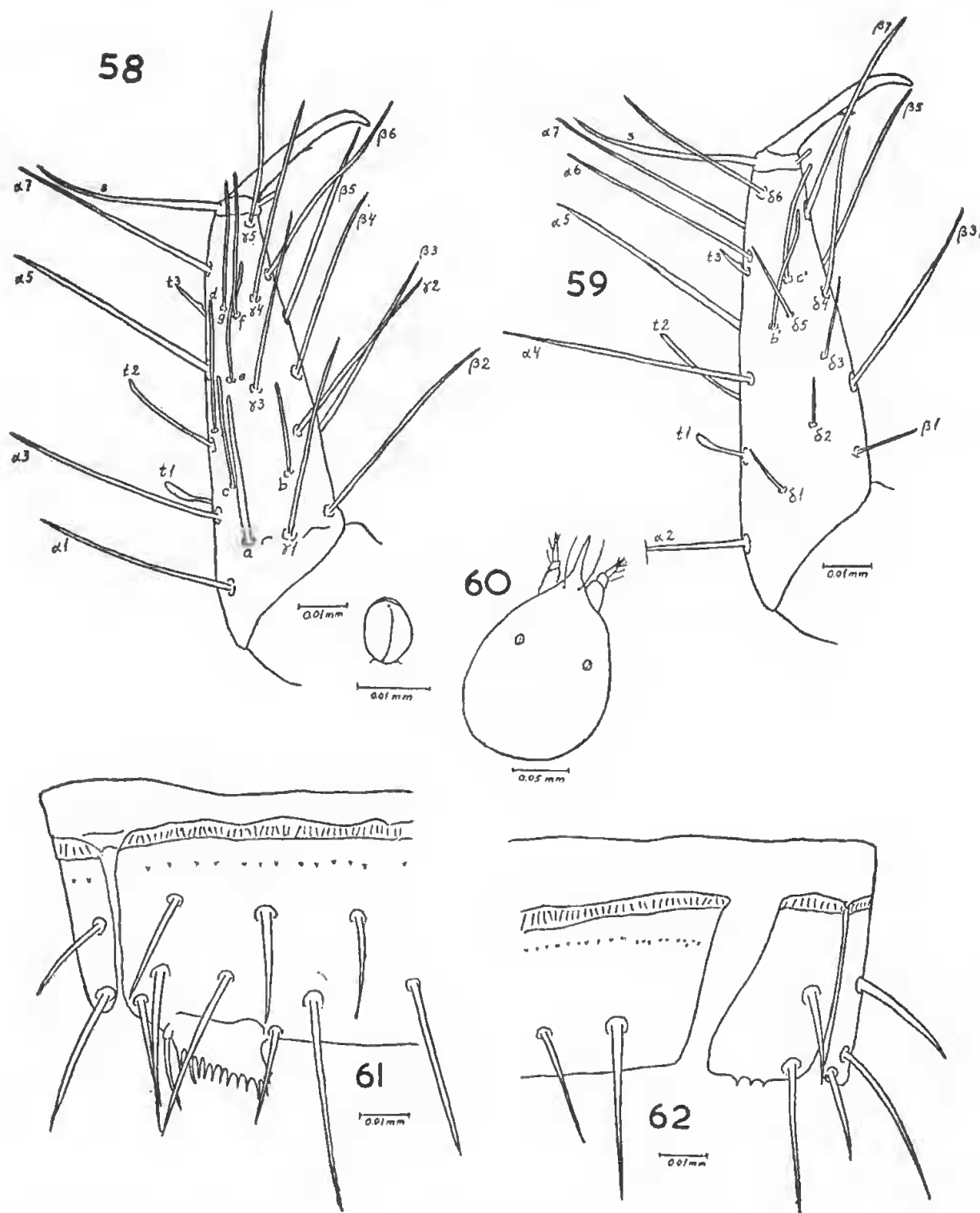


Fig. 58-62. *Acerentomon pinus* Wom.; Holotype, a matus junior. 58, foretarsus exterior side; 59, interior side of same tarsus; 60, contour of head and a pseudoculus; 61, comb of abd. VIII; 62, pleurite and half of sternite VIII.

14. *Acerentulus capensis* Womersley

*Acerentulus capensis* Womersley 1931 p. 89, fig. 1-2.

Fig. 63-69.

This is the first species of *Acerentulus* to be described by Womersley, based on two specimens collected at Cape Town, S. Africa, on his way to Australia. The two specimens in the South African Museum have been kindly lent to me by Dr. A. J. Hesse. One specimen is a female but unfortunately all six legs are missing, the other is a maturus junior. As the characters of the foretarsus are of such paramount importance in *Acerentulus* and alike in all stages except the prelarva, I am forced to make the maturus junior the lectotype describing it as follows; the chaetotaxy, however, will be given from the female. Both specimens are labelled "Orangezicht, Cape Town, 6/9/30. H.W."

The foretarsus (fig. 63-64) is first and foremost characterised by the large bottle-shaped sensilla a' which I have not seen in any other species of *Acerentulus*, t1 is club-shaped, t2 long and slender, t3 small and not lancet-like but long-oval without pointed apex (also a distinguishing character from other *Acerentulus* species), a-d and f are all equally long and slender, e and g shorter, e is placed nearer to f than to d, b is a little stouter than the other ones. On the inner side b' is missing, c' long and slender. TR = 3.3, e:u = 1:7.

The filamento di sostegno (fig. 65) is rather short, not reaching the tip of the inner arm of the fulcrum. The comb of abd. VIII (fig. 66) consists of six short teeth.

The chaetotaxy of the female (fig. 67-69) is as follows with the pleural setae included in the tergal counts.

	I	II-III	IV-V	VI	VII	VIII	IX	X	XI	XII
t	$\frac{6}{12}$	$\frac{8}{14}$	$\frac{8}{14}$	$\frac{10}{14}$	$\frac{6^{(14)}}{16}$	$\frac{6}{14}$	14	12	6	9
u	$\frac{3}{4}$	$\frac{3}{5}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	4	4	4	6	6

I have figured the whole tergal chaetotaxy of the abdomen to show a curious feature. In the anterior row "3" is placed further back than the other setae. In abd. VI this is even more pronounced and in VII the seta has retreated right back into the posterior row. This retreating of "3" of the anterior row is met with, more or less pronounced, in many Protura. The striated band which occurs in all

(14) "1" is missing.

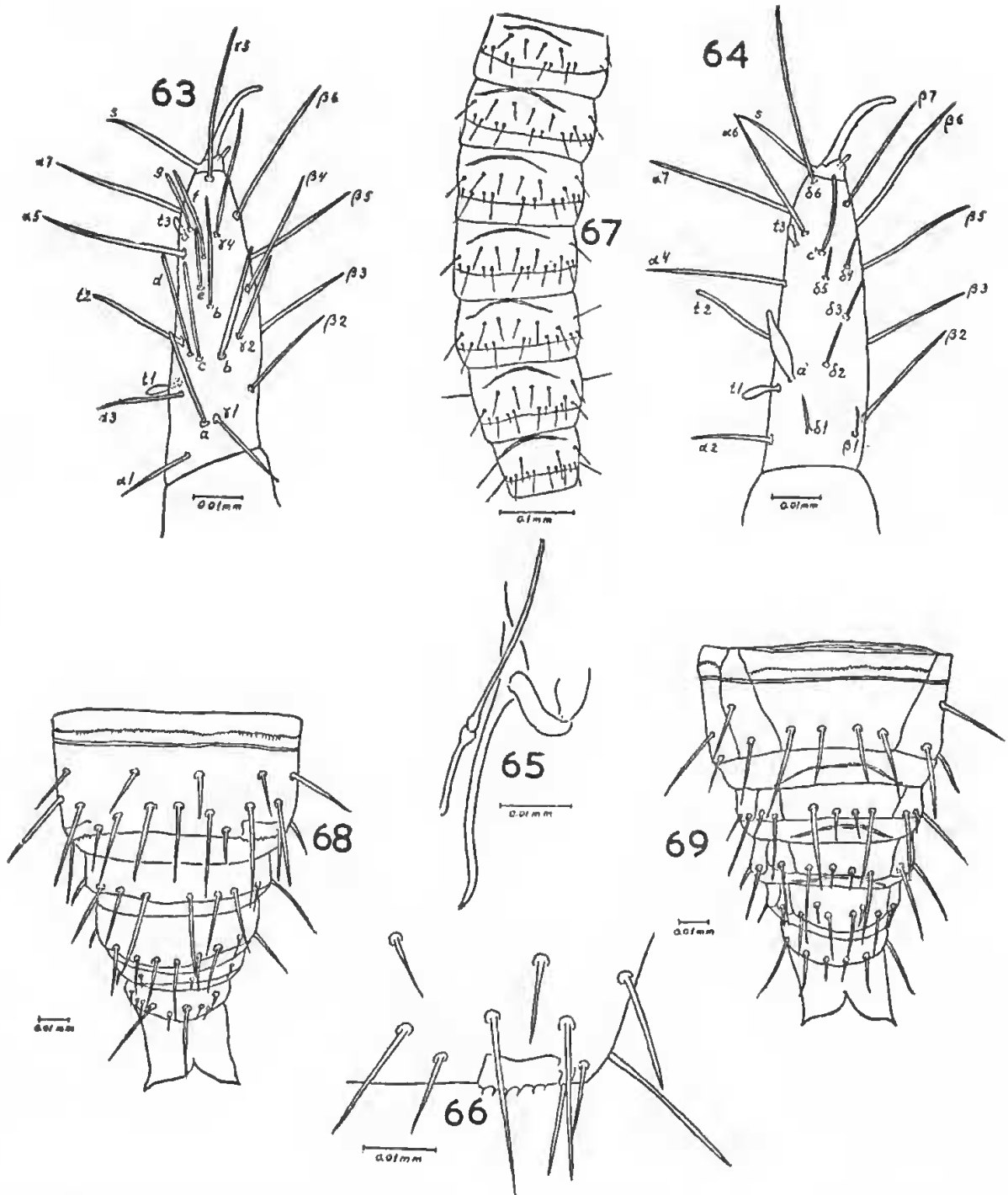


Fig. 63-69. *Acerentulus capensis* Wom. 63, 64 and 66 from lectotype, a maturus junior, 65, 67, 69 from a ♀. 63, foretarsus exterior side; 64, interior side of same; 65, filamento di sostegno; 66, comb of abd. VIII; 67, tergal chaetotaxy of abd. I-VII; 68, same of abd. VIII-XII; 69, sternal chaetotaxy of abd. VIII-XII.



*Acerentominae* on the anterior part of the eighth abdominal segment has a curious appearance in this species. The striae are almost entirely invisible; instead the anterior border consists of a row of very fine teeth, shorter or longer, and the posterior border of two exactly parallel lines (fig. 68-69). I have unfortunately only observed it in this one specimen but may be the clue to what this striated band really is lies hidden in this species.

The species is easily distinguished on the shape of *a'* in the foretarsus.

*Lectotype*: A maturated junior from "Orangezicht, Cape Town, 6/9/30. H. Womersley" in the South African Museum, Cape Town.

### 15. *Acerentulus westraliensis* Womersley

*Acerentulus westraliensis* Womersley 1932 p. 71, fig. 9-12; 1939 p. 286, fig. 78 E-H.

Fig. 70-75.

The description and drawings of this species were repeated unchanged in the 1939 publication. Several slides are present in the collection and I have chosen a male from Crawley, Western Australia, as a lectotype which is described as follows:

The foretarsus (fig. 70-71) has very long and slender sensillae a-g, a is a little stouter than the others, e is placed quite near f, and b, c, and d are not in a line, t1 is slender and club-shaped, t2 long and slender, t3 short-oval and not lancet-like. On the inner side *a'* is long and thick, *b'* and *c'* long and slender. TR = 3.5, e:u = 1:8.

The filamento di sostegno (fig. 72) is rather long and most unusually the posterior end seems to be shortly three-lobed.

The comb on abd. VIII (fig. 73) consists of five slender dispersed teeth.

The chaetotaxy (fig. 74-75) is as follows:

	I	II	III	IV-V	VI	VII	VIII	IX	X	XI	XII
t	$\frac{6}{12}$	$\frac{8^{(15)}}{14}$	$\frac{8}{14}$	$\frac{8}{14}$	$\frac{10}{14}$	$\frac{8^{(17)}}{16}$	$\frac{6}{14}$	14	12	6	9
s	$\frac{3}{4}$	$\frac{2^{(16)}}{5}$	$\frac{3}{5}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$4^{(18)}$	4	4	6	6

*Lectotype*: A male from "Crawley W.A., 8/5/31, D. C. Swan", in the South Australian Museum, Adelaide.

(15) "5" is missing; (16) but normally 3; (17) "3" in anterior row, retreated to posterior row; (18) normally in a row.

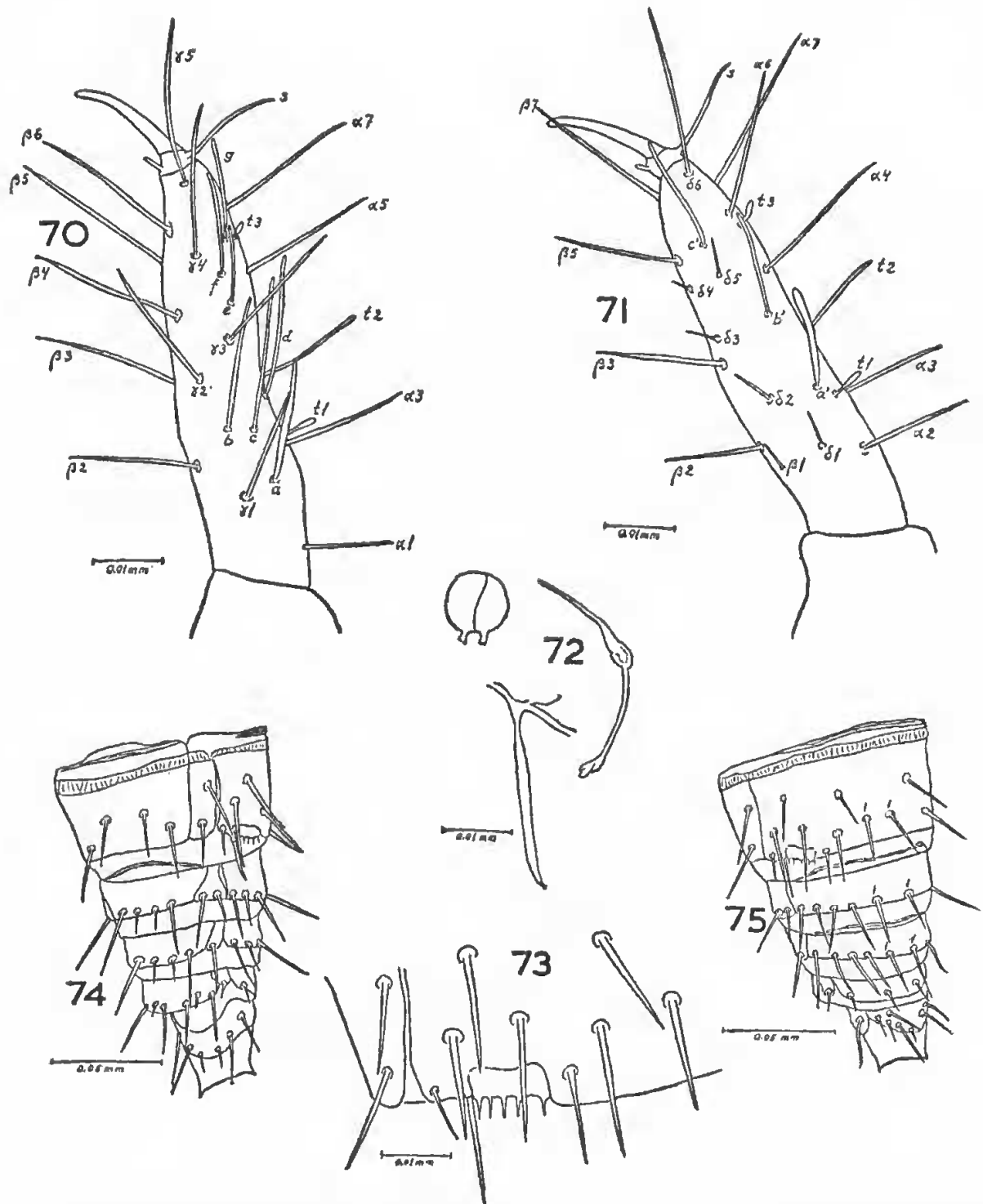


Fig. 70-75. *Acerentulus westraliensis* Wom.; Lectotype ♂. 70, foretarsus exterior side; 71, interior side of same; 72, filamentum di sostegno and pseudoculus; 73, comb of abd. VIII; 74, tergal chaetotaxy abd. VIII-XII; 75, sternal chaetotaxy abd. VIII-XII.

16. *Acerentulus australiensis* Womersley

*Acerentulus australiensis* Womersley 1932 p. 72, fig. 3, 11-12; 1939 p. 284, fig. 78 I-L.

Fig. 76-80.

This species is said to have been found "on only one occasion" which seems to imply only one specimen as only one slide with a male, from "Crawley, W.A. 30/10/30. D. C. S." is present in the collection exactly as stated in the description, repeated unchanged in 1939. Both foretarsi (fig. 76) are seen directly from above, but only one is drawn. It is seen to be very close to that of *westraliensis* in the length and position of the sensillae.  $TR = 3.9$ ,  $e:n = 1:6$ .

The filamento di sostegno (fig. 77) is three-lobed at the proximal end and does not exceed the proximal arm of the fulcrum.

The comb of abd. VIII (fig. 78) with 8 very small teeth.

The chaetotaxy (fig. 79-80) is as follows:

	I	II-III	IV-V	VI	VII	VIII	IX	X	XI	XII
t	$\frac{6}{10}$	$\frac{8}{10}$	$\frac{8}{10}$	$\frac{10}{10}$	$\frac{8}{16}$	$\frac{6}{14}$	14	12	6	9
a	$\frac{3}{4}$	$\frac{3}{6}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	3	4	4	6	6

The difference which Womersley notes is that sternite VIII has only three setae. This is quite unusual and may be due to individual variation but another difference is that "1a" and "4a" are missing in all posterior rows of tergites I-VI (fig. 79).

The species was founded on only a single specimen from the same locality (University Grounds, Crawley, Western Australia) as the 6 specimens of *westraliensis* on which the description of the latter species was based. Only the specimen of *australiensis* was collected on October 30th, 1930, the other specimens on November 2nd, 1930, and April-July, 1931, all by Mr. D. C. Swan. I would be tempted to synonymise the two species as all characters except the chaetotaxy are alike, and I would not hesitate to regard the chaetotaxy of sternite VIII as an abnormality, but I have not known earlier examples of the missing of the accessory hairs in the posterior tergal rows being due to individual variation. It might be a pre-imago  $\delta$  (in *A. danicus* Condé, "1a" is missing in the posterior tergal rows in this stage), but the genital squama is distinct and fully developed. Also the comb of abd. VIII is different from that of *westraliensis*.

*Holotype*: A male from "Crawley, W.A., 30/10/30. D. C. Swan" in the South Australian Museum, Adelaide.

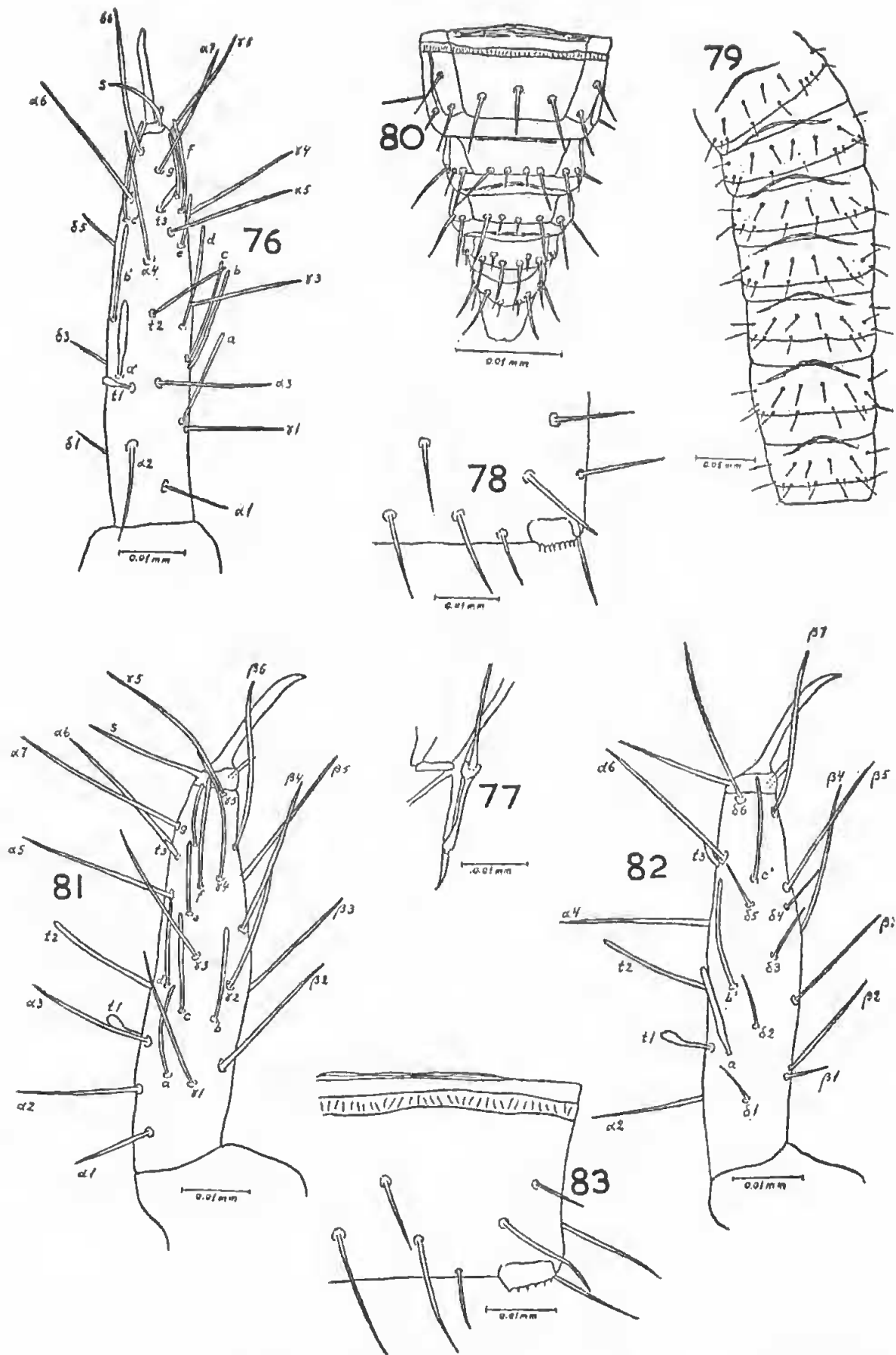


Fig. 76-80. *Acerentulus australiensis* Wom.; Holotype ♂. 76, foretarsus from above; 77, filamento di sostegno; 78, comb of abd. VIII; 79, tergal chaetotaxy of abd. I-VII; 80, sternal chaetotaxy of abd. VIII-XII.

Fig. 81-83. *Acerentulus tillyardi* Wom.; Lectotype ♀. 81, foretarsus, exterior side; 82, interior side of same; 83, comb of abd. VIII.

17. *Acerentulus tillyardi* Womersley

*Acerentulus tillyardi* Womersley 1932 p. 73, fig. 1, 2, 13, 14; 1939 p. 284, fig. 77 A-F'.

Fig. 81-83.

Womersley writes that this is the only species found in the Eastern Australian States. It was first found by Dr. R. J. Tillyard at Blundells', F.C.T., 18th February, 1931, but only one specimen which now appears to be lost. Several other specimens were found the same year at Belgrave, Victoria, on the 19th April. Of these, two slides are present in Womersley's collection, one a pre-larva, the other a female; I select the latter as a lectotype. Several other slides are also present, found after the publication of the original description, and some of these are referred to in 1939.

Womersley says that the species is very similar to *A. westraliensis* but differs distinctly in the value of TR which he gives as 3.5 in *westraliensis* and 3.0 in *tillyardi*. This, however, is the only difference he gives.

I have examined and drawn the lectotype though its state of preservation does not permit me to see the characters of the foretarsus and the pseudoculi as clearly as in other species, nor can the filamento di sostegno be seen at all. I give the drawings of the foretarsus (fig. 81-82) with the sensillae as clearly as possible but my conclusion is that the small differences from the two preceding species are due only to my difficulty in examination.  $TR = 3.0$ ,  $e:a = 1:6$ .

The comb of the eighth abdominal tergite (fig. 83) has six dispersed teeth as in *westraliensis*, but they are extremely short as in *australiensis*.

The chaetotaxy is exactly as in *australiensis*, except that  $s\ VIII = 4$ .

*Lectotype*: A female from "Belgrave (Victoria) 19/4/31, coll. F. H. Drummond" in the South Australian Museum.

The preceding three species of *Acerentulus* seem to me to be very close to one another—if they are really different. The foretarsi are very much alike as to size and disposition of the sensillae. The ratio TR, however, varies in the three type specimens. The filamento di sostegno is three-lobed proximally in two of them and possibly also in *tillyardi* (could not be seen). The abd. comb VIII consists of 6 longer

teeth in *westraliensis*, 8 short ones in *australiensis* and 6 short ones in *tillyardi*, and in all three species dispersely set. The chaetotaxy differs in so far as "1a" in the posterior row of the abdominal segments is missing in *australiensis* and *tillyardi* (s VIII = 3 in *australiensis* may be regarded as abnormal). I have examined the other specimens found after the publication of the original description and find that one is a true *westraliensis*, the others are like *westraliensis* but with the chaetotaxy as in *tillyardi*.

### 18. *Acerentulus occidentalis* Womersley

*Acerentulus occidentalis* Womersley 1932 p. 73, fig. 15-16; 1939 p. 285, fig. 78 A-P.

Fig. 84-90.

This species was described in 1932 (repeated unchanged in 1939) from seven specimens, two from the "University Grounds, Crawley, W.A. 28/4/31 and 29/6/31", and five specimens from "Fairbridge Farm, Pinjarra, W.A. 20/9/31, under stones", all collected by Mr. D. C. Swan. Two slides are present in the collection of which I select a female as the lectotype described as follows:

The foretarsus (fig. 84-85) is very much like that of the preceding species, t1 slenderly club-shaped, t3 not lancet-like, b shorter than e, e placed very near to f, a' is thicker than all the other sensillae. TR = 4.0, e:n = 1:8.

The filamento di sostegno (fig. 86) is longer than the arm of the fulcrum, and weakly three-lobed at the proximal end. The shape of the head is seen in fig. 87; there is a distinct labrum. Abdominal comb VIII (fig. 88) has 15 very closely set and rather long teeth.

The chaetotaxy is as follows (fig. 89):

	I	II-III	IV-V	VI	VII	VIII	IX	X	XI	XII
t	$\frac{6}{12}$	$\frac{8}{14}$	$\frac{8}{14}$	$\frac{10}{14}$	$\frac{8}{16}$	$\frac{6}{14}$	14	12	6	9
s	$\frac{3}{4}$	$\frac{3}{5}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{2}{2}$	4	4	6	6

This is exactly as in *westraliensis* except that the two median setae on sternite VIII are placed in an anterior row. The tergal apodemes are slightly branched.

*Lectotype*: A female from "Crawley, W.A. 21/4/31, coll. D. C. Swan", in the South Australian Museum, Adelaide.

This species is distinctly different from the three preceding species but the great resemblance in the foretarsus is very curious. The

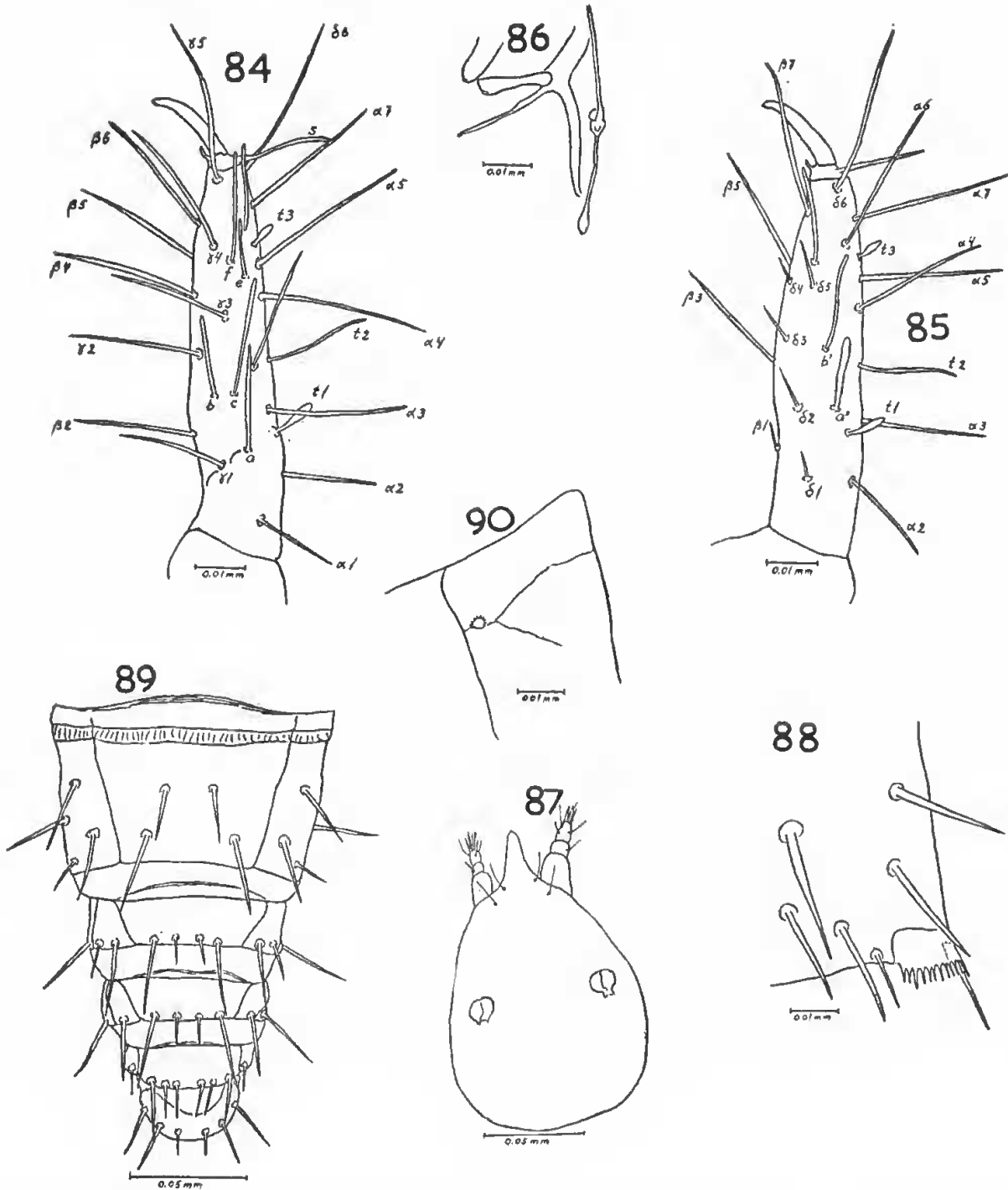


Fig. 84-90. *Acerentulus occidentalis* Wom.; Lectotype ♀. 84, foretarsus, exterior side; 85, interior side of same; 86, filamento di sostegno; 87, contour of head; 88, comb of abd. VIII; 89, sternal chaetotaxy of abd. VIII-XII; 90, anterior part of pleurite VII, sternum to left.

abd. comb VIII, however, distinguishes it clearly as also does the disposition of the sternal setae on abd. VIII. The presence of a labrum is quite unexpected. With uncertainty as to the real difference between *Acerentulus* and *Acerentomon* I should not like to transfer the species to the latter genus: firstly because of the great similarity of the foretarsus and the filamento di sostegno to the *Acerentulus* species, and secondly because it shows no pleural row of teeth on abd. VIII as species of *Acerentomon* generally do, nor is there a pectine on pleurite VI or VII. The only feature reminiscent of this is the "rotary-wheel" which is present on pleurite VII (fig. 90) and which I have not observed in the preceding *Acerentulus* species.

### 19. *Acerentulus sexspinatus* Womersley

*Acerentulus sexspinatus* Womersley 1936 p. 65, fig. 1-2; 1939 p. 286.

Fig. 91-98.

This species was described in 1936 from a number of specimens collected by Mr. D. C. Swan from under stones "on banks of the River Onkaparinga, near Noarlunga, South Australia, April 25th, 1932". Later, Womersley collected two adult and five immature specimens from under stones on the banks of the stream in the Bolganup Ravine, South Western Australia, 30/9-1/10/32. Slides of these specimens are not present in Womersley's collection. The description was repeated in 1939.

As justified in the introduction I select one of the original collection, marked as "type" as a lectotype and describe it as follows:

The foretarsus (fig. 91-92) is provided with very long and slender sensillae, only *a'* being stout but long, *t1* is slenderly club-shaped, *t3* long and lancet-like. TR = 6.0, e:u = 1:7.

The filamento di sostegno (fig. 93) is as long as the proximal arm of the fulcrum; its proximal end two-lobed, heart-shaped. Fig. 94 shows the shape of the head and the exceptionally broad pseudoculi.

The comb of Abd. VIII (fig. 95) with about 10 closely set teeth.

The chaetotaxy (fig. 96-98) is as follows:

	I	II-III	IV-V	VI	VII	VIII	IX	X	XI	XII
t	$\frac{6}{10}$	$\frac{8}{12^{(10)}}$	$\frac{8}{12}$	$\frac{8}{14}$	$\frac{8}{18}$	$\frac{6}{16}$	12	12	6	9
s	$\frac{3}{4}$	$\frac{3}{5}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{4}{2}$	4	4	6	6

(10) "1a" is missing.



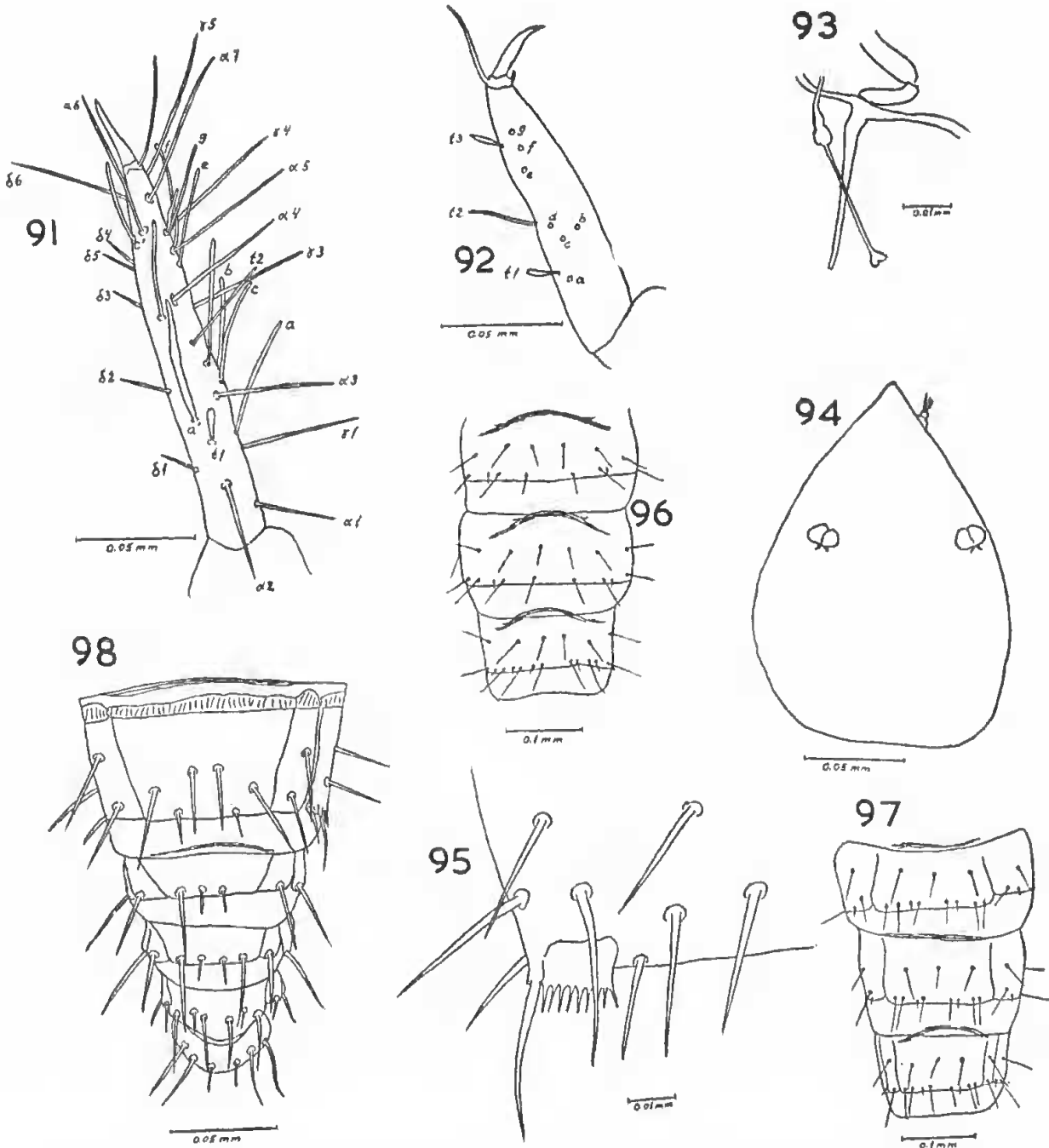


Fig. 91-98. *Accrentulus sexspinatus* Wom.; Lectotype ♀. 91, foretarsus from above; 92, same of paratype, exterior side to show disposition of sensillae; 93, filamento di sostegno; 94, contour of head; 95, comb of abd. VIII; 96, tergal chaetotaxy of abd. V-VII; 97, sternal chaetotaxy of abd. V-VII; 98, sternal chaetotaxy of abd. VIII-XII.

It is important how many accessory setae have been added to the posterior row on tergite VII. Also the number of setae on sternite VIII is different from that in the other Australian species of *Acerentulus*.

*Lectotype*: A female from "Onkaparinga Riv., Noarlunga, S.A., 25/4/32, D. C. Swan" in the South Australian Museum.

This species is readily distinguished from the other Australian species by the very small claw of the foretarsus, the long t3, the filamento di sostegno and the comb and chaetotaxy of abd. VIII.

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